

FIG. 1a (Prior Art)

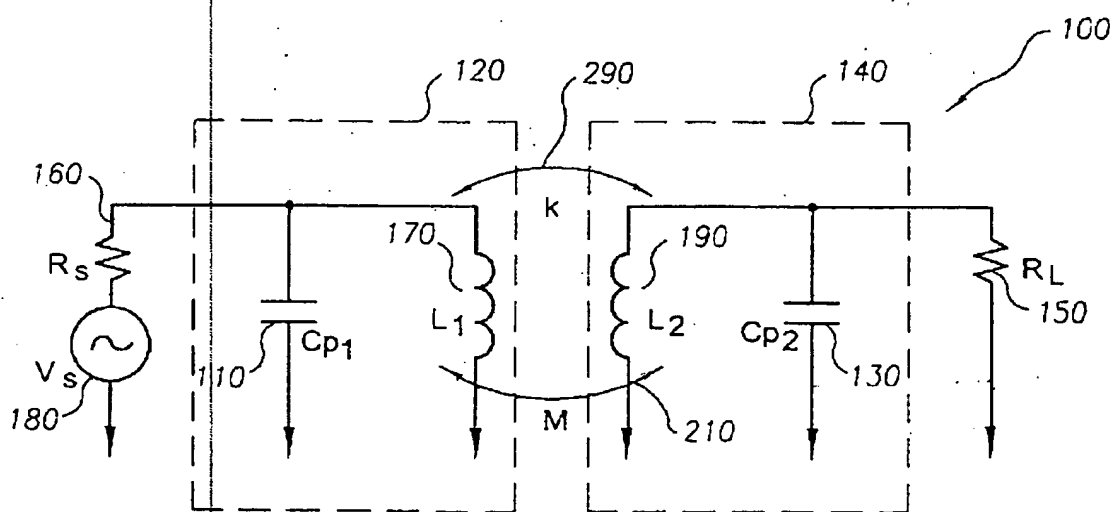


FIG. 1b (Prior Art)

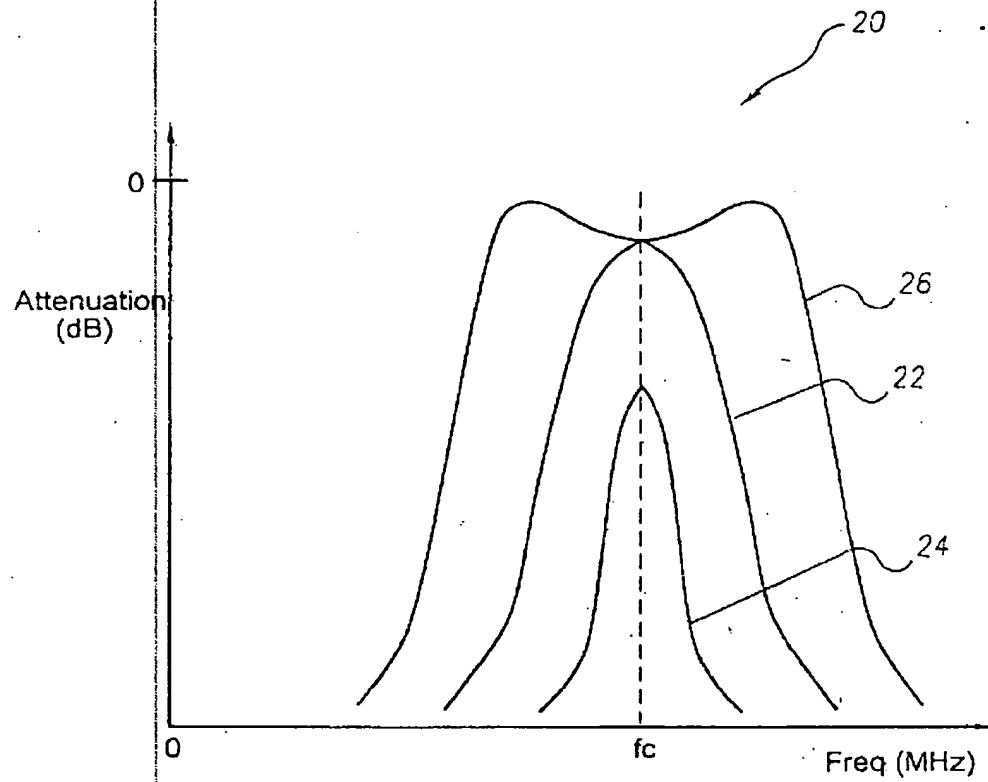
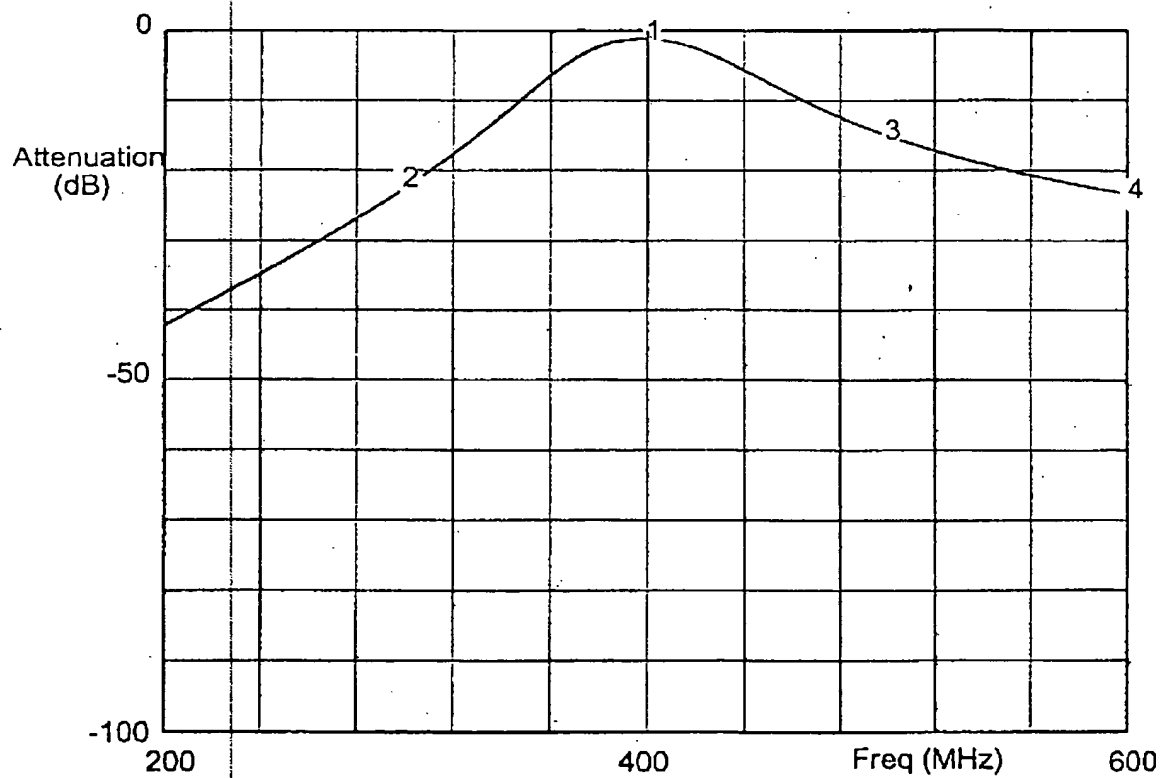
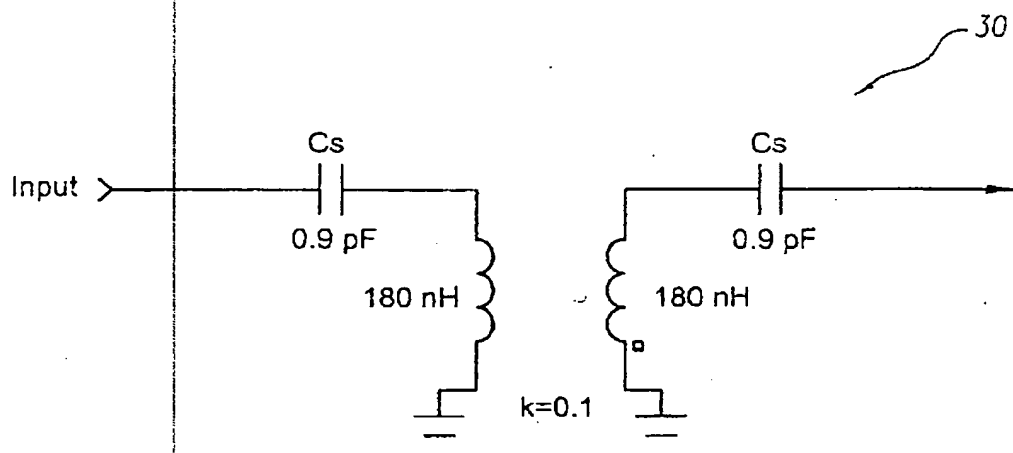


FIG. 2



— DB[S21]

1 { 400	2 { 300	3 { 500	4 { 600
-1.19704	-22.4326	-15.0734	-23.2958

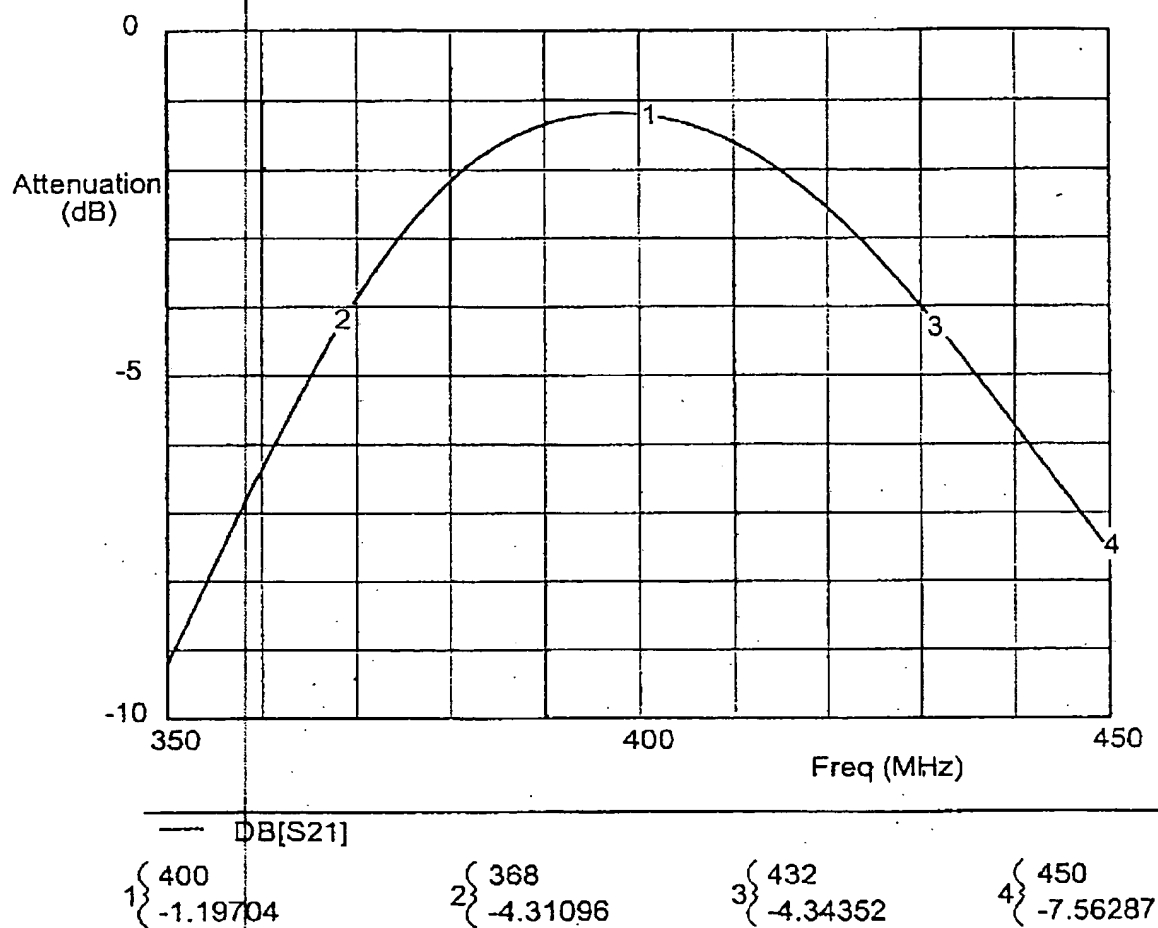


FIG. 4b (Prior Art)

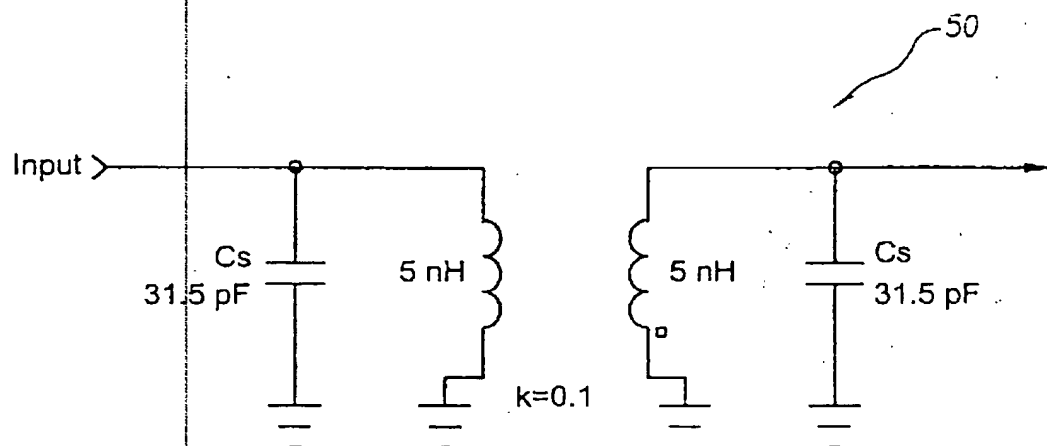
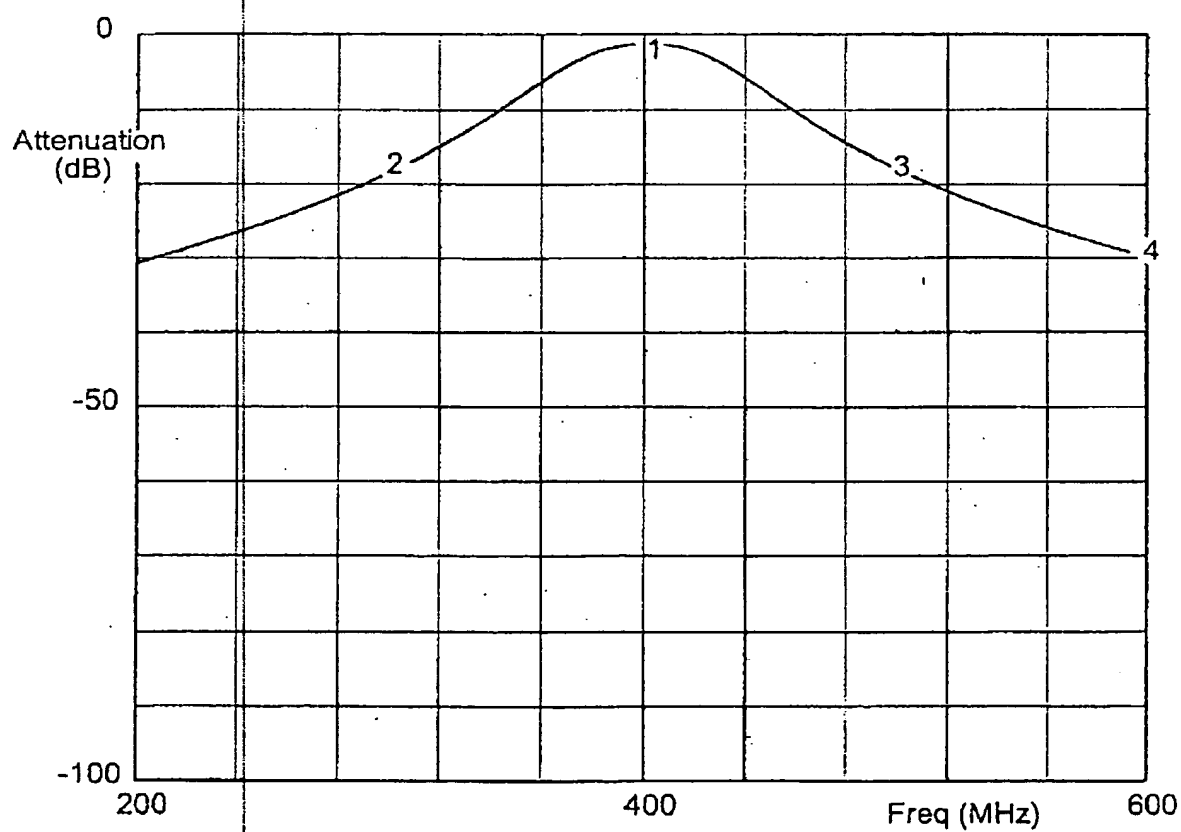


FIG. 5 (Prior Art)



— DB[S21]

1 { 400
-1.168082 { 300
-18.36173 { 500
-17.92974 { 600
-29.7704

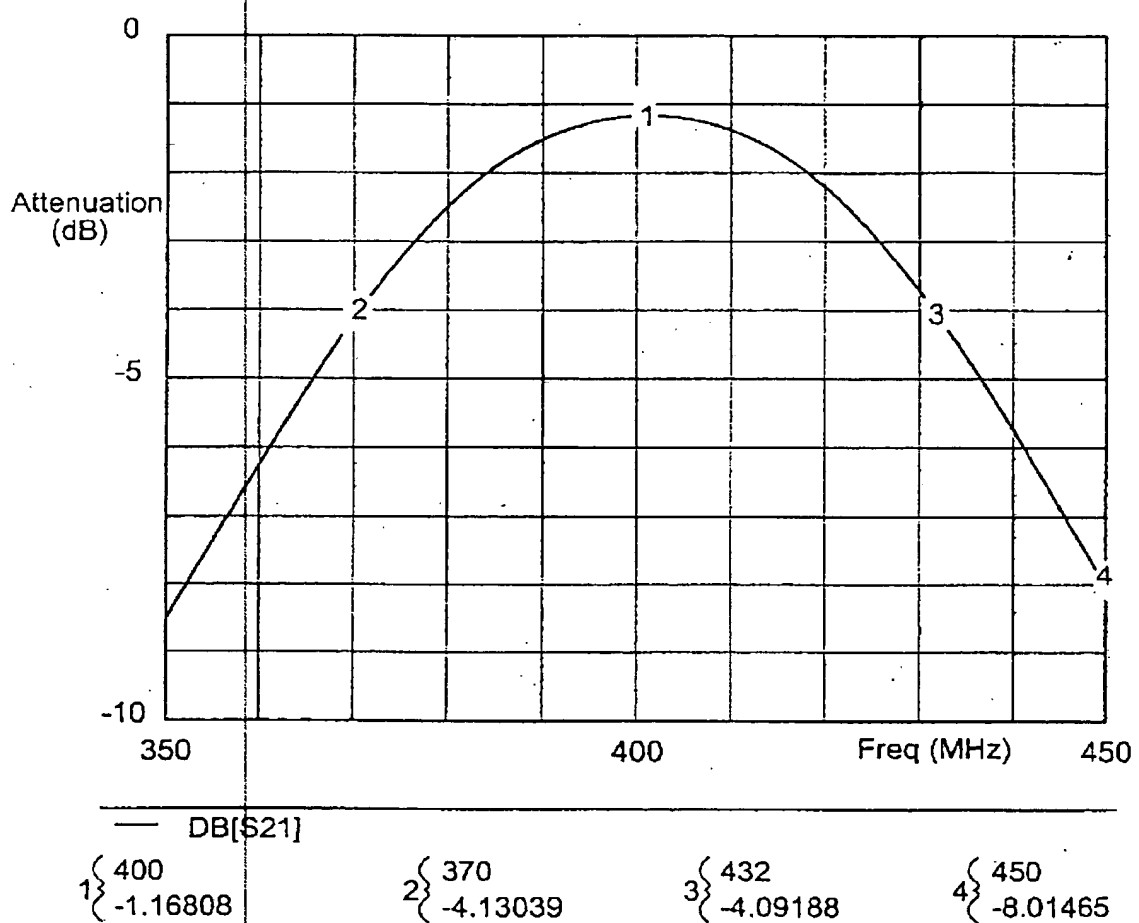


FIG. 6b (Prior Art)

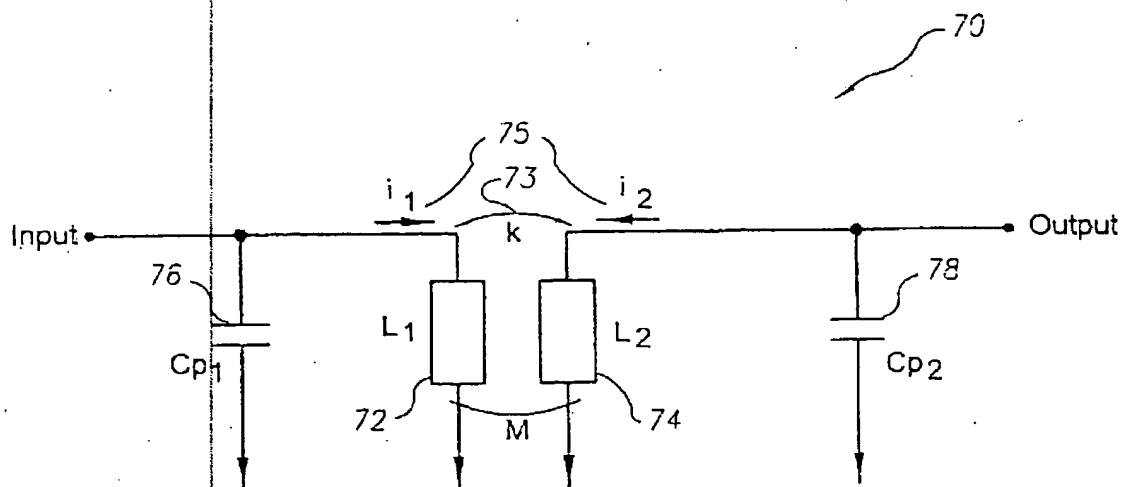


FIG. 7

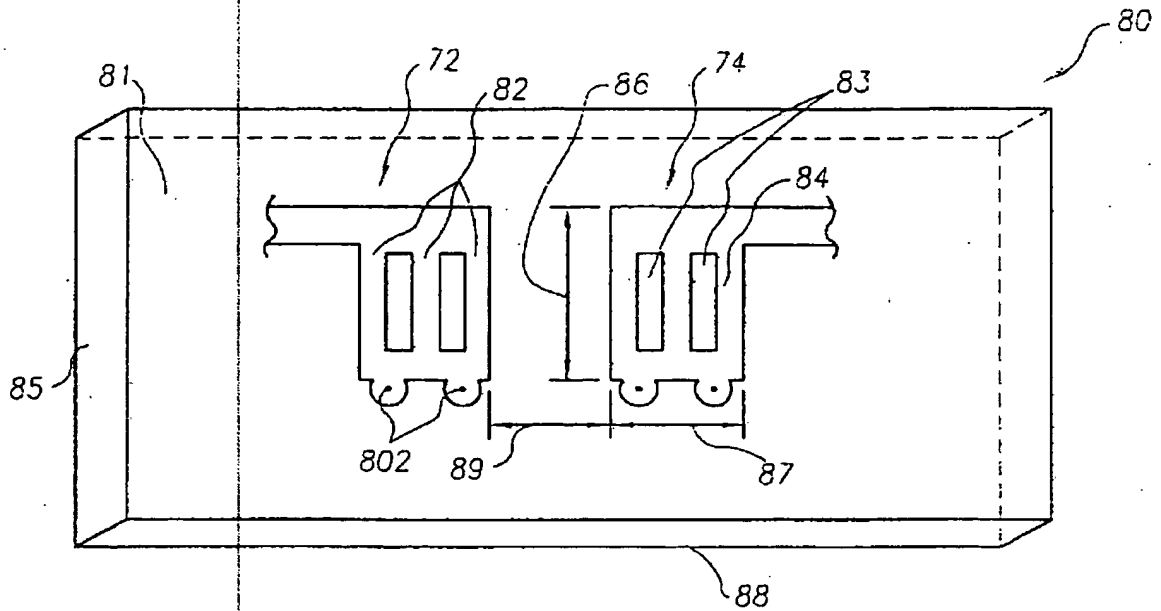
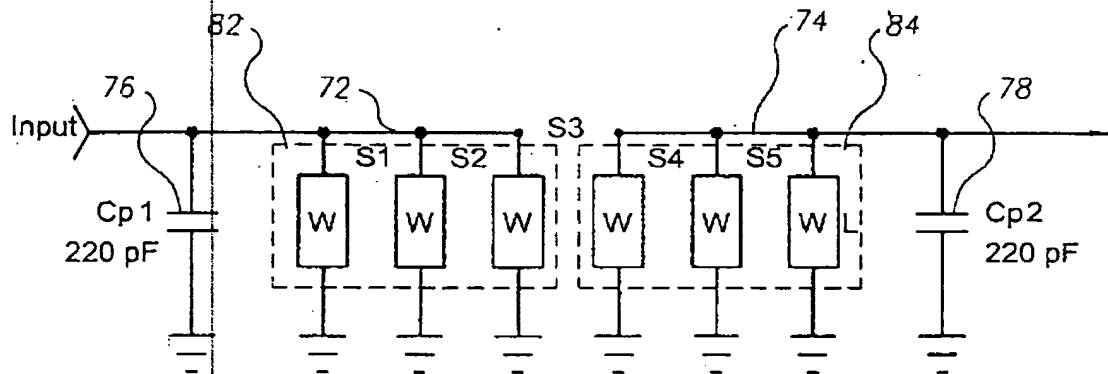
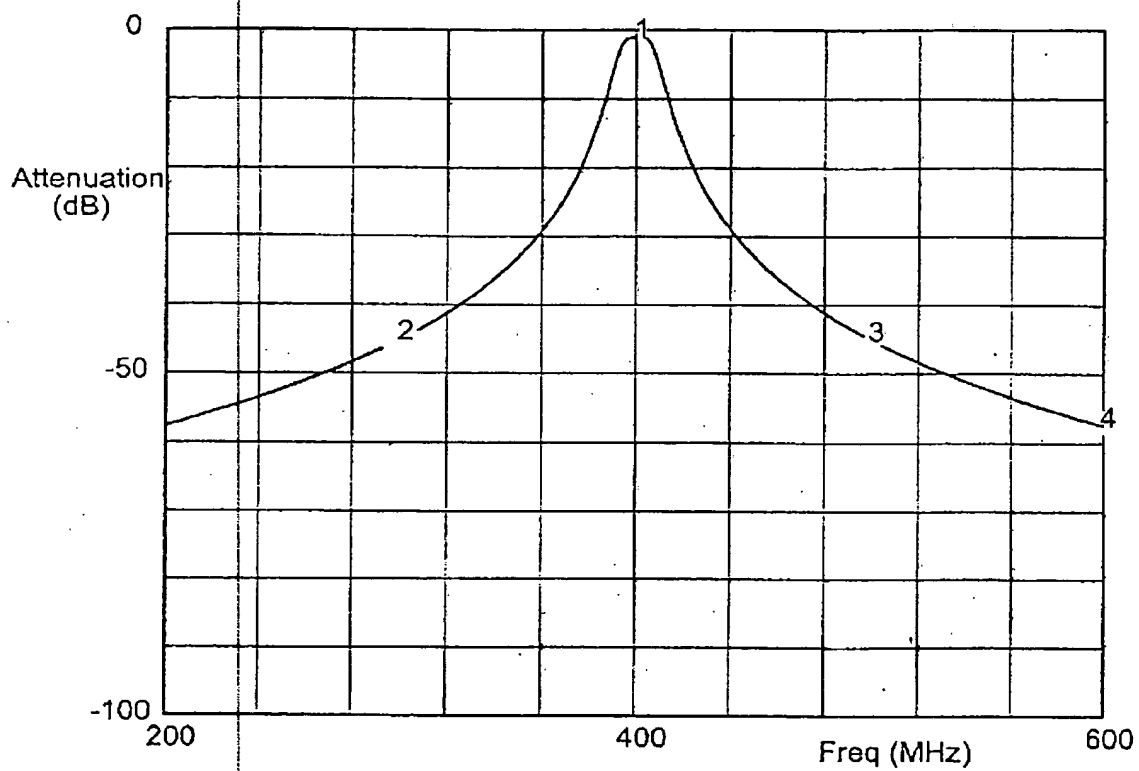


FIG. 8a

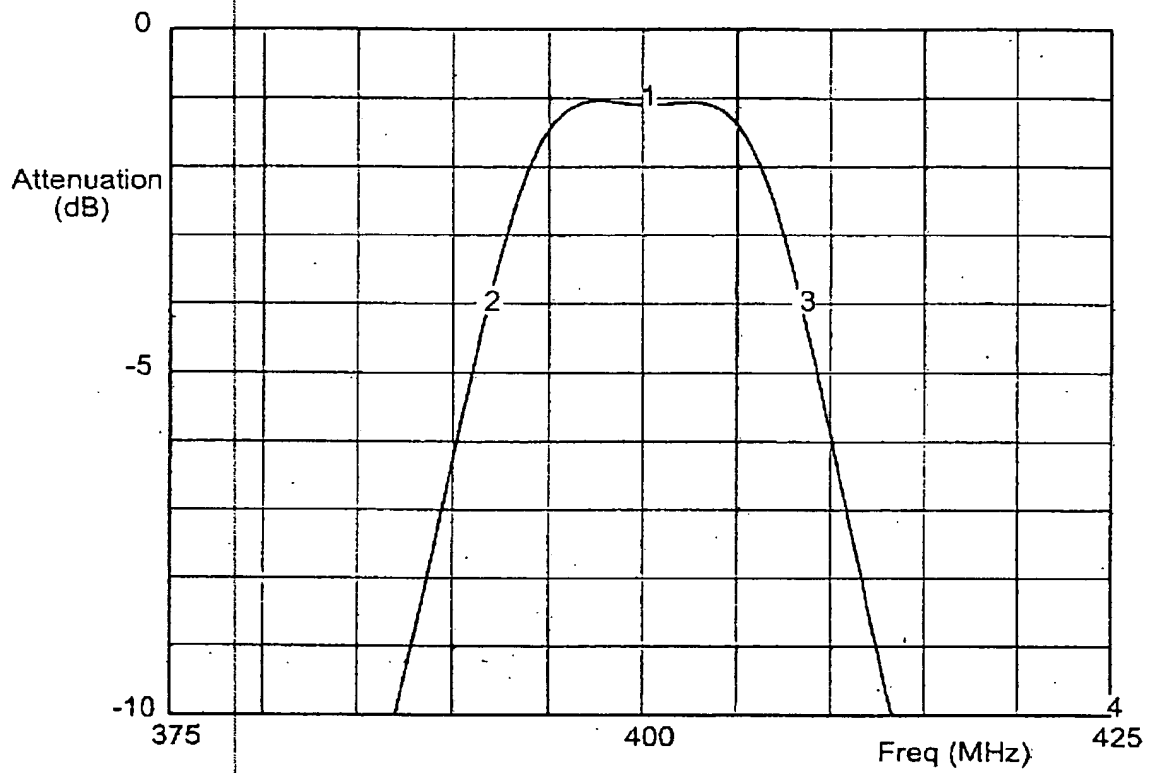


Multistrip_coupled microstrip
line(2 resonators, 3 lines each)
Width $W=2$ mm, Length $L=5.5$ mm
Gaps: $S1=S2=S4=S5=3.45$ mm
 $S3 = 3$ mm
Dielectric: $\epsilon_r=4.65$, $\tan\delta=0.001$
Board thickness (hight) $H=1.5$ mm



DB[S21]			
1 { 400	2 { 300	3 { 500	4 { 600
-1.09187	-45.092	-45.1217	-57.4546

FIG. 9a



— DB[S21]

1 { 400
-1.091872 { 391.75
-4.092123 { 408.5
-4.086234 { 425
-20.7976

FIG. 9b

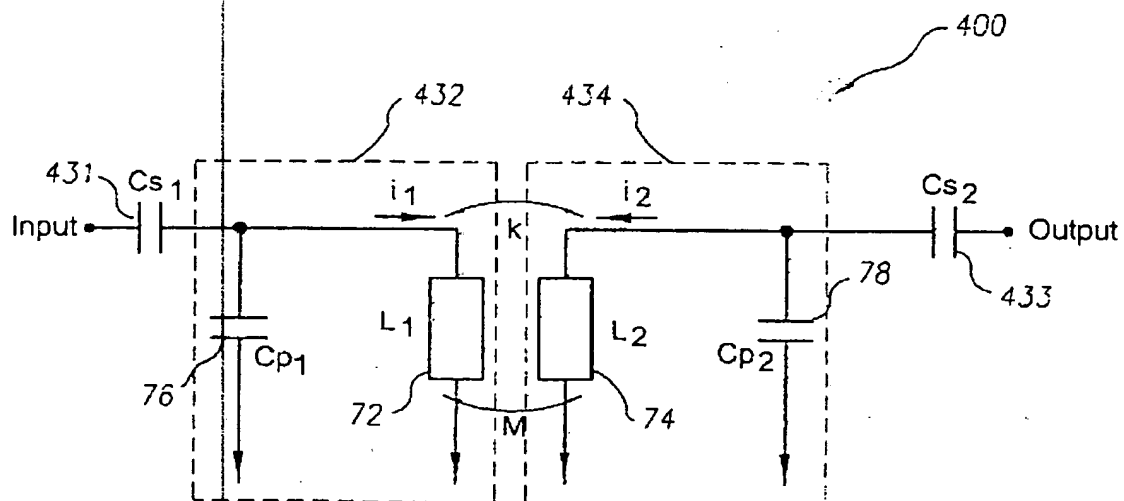


FIG. 10a

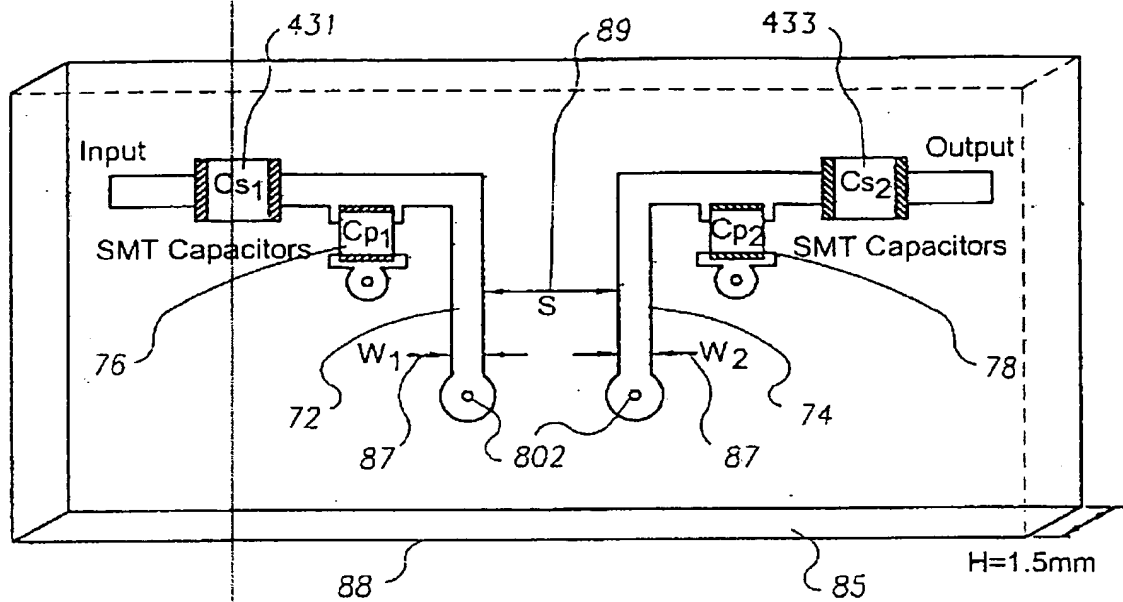


FIG. 10b

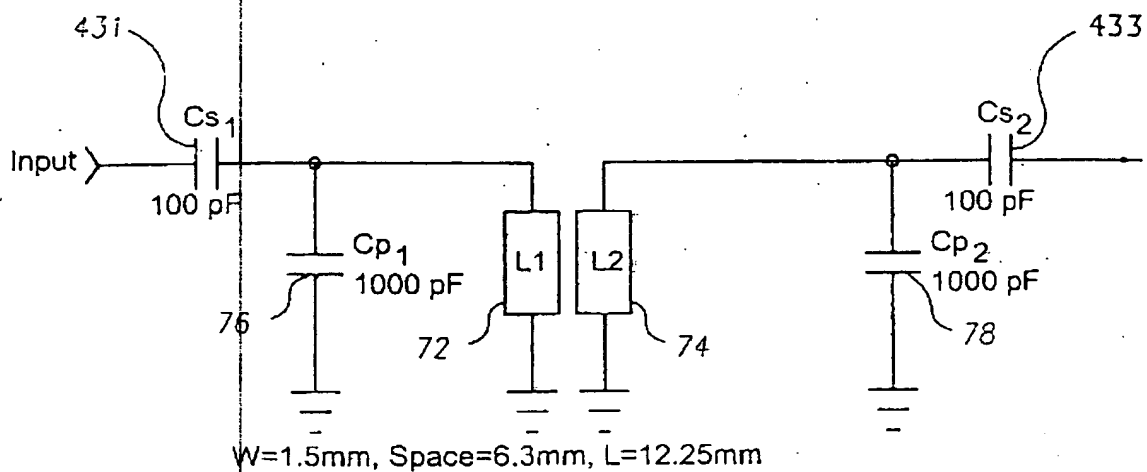
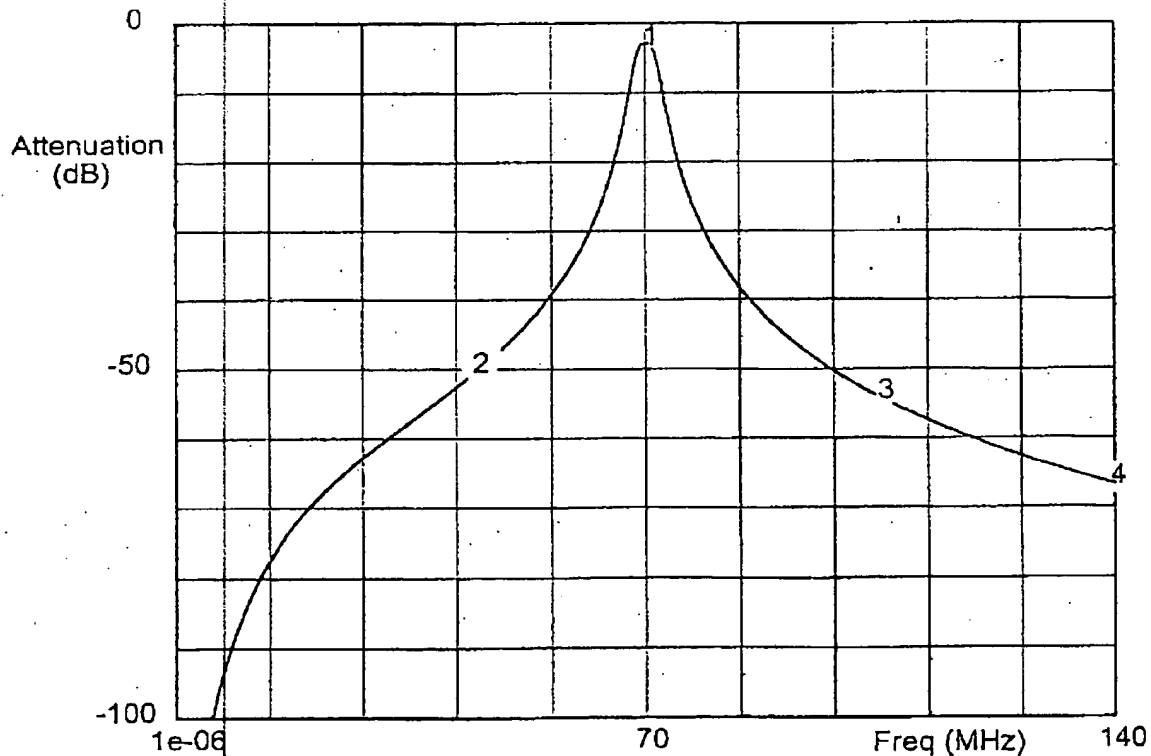


FIG. 11



— DB[S21]			
1 { 70	2 { 44.8	3 { 105	4 { 140
-2.7315	-50.2972	-54.2752	-66.7522

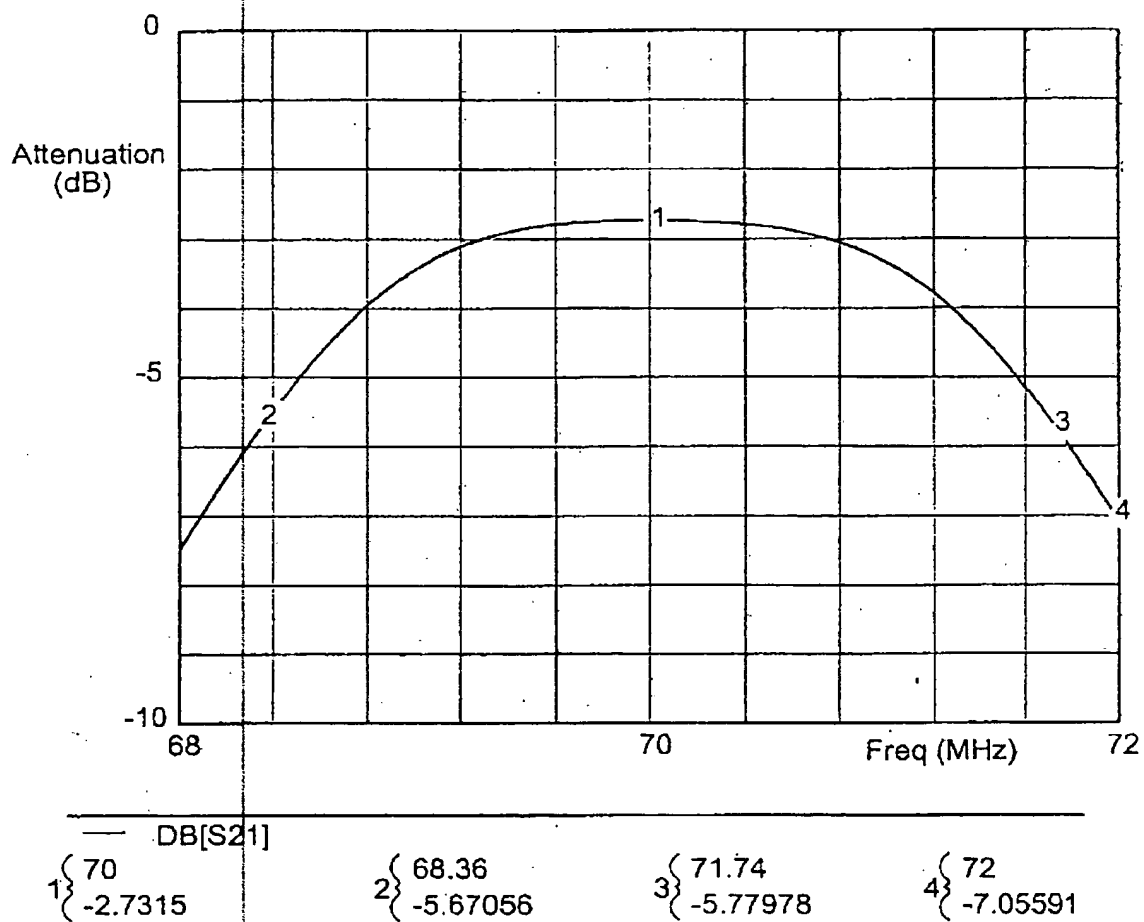


FIG. 12b

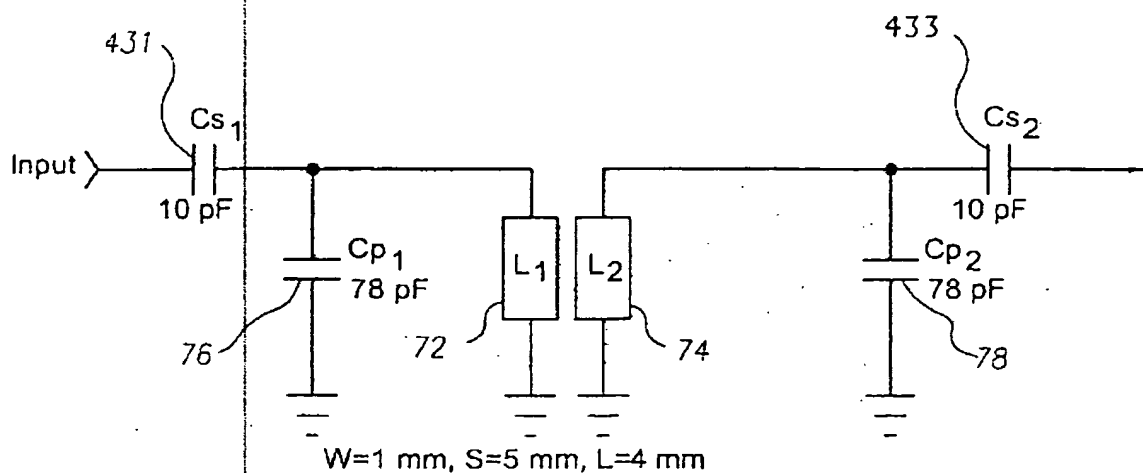
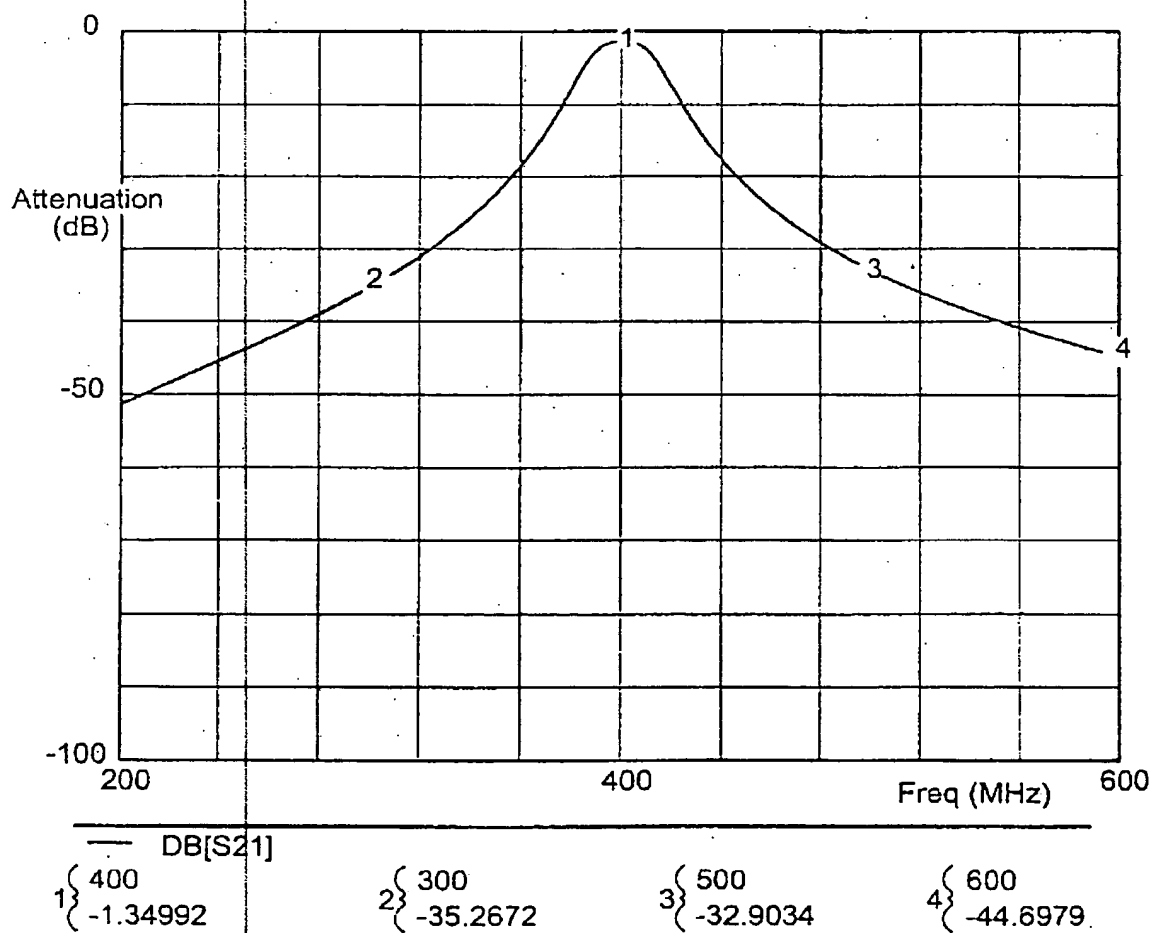


FIG. 13



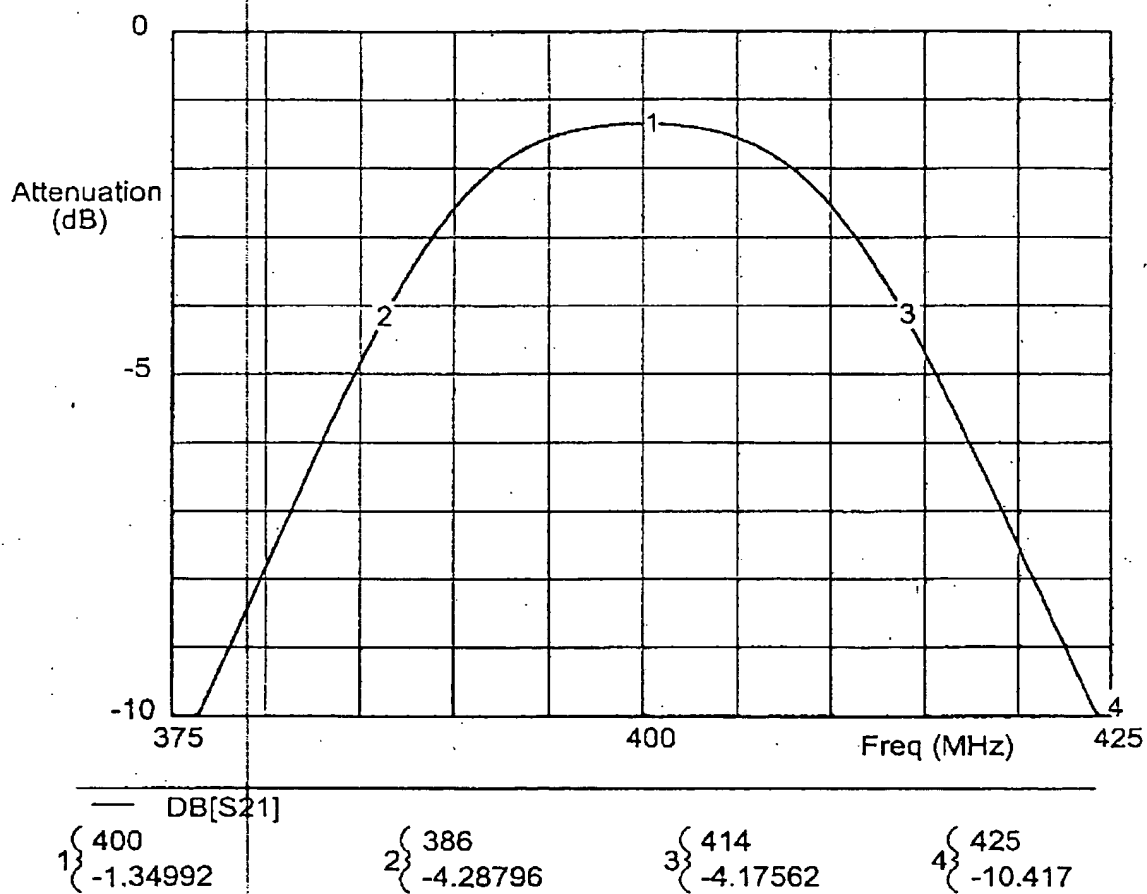


FIG. 14b

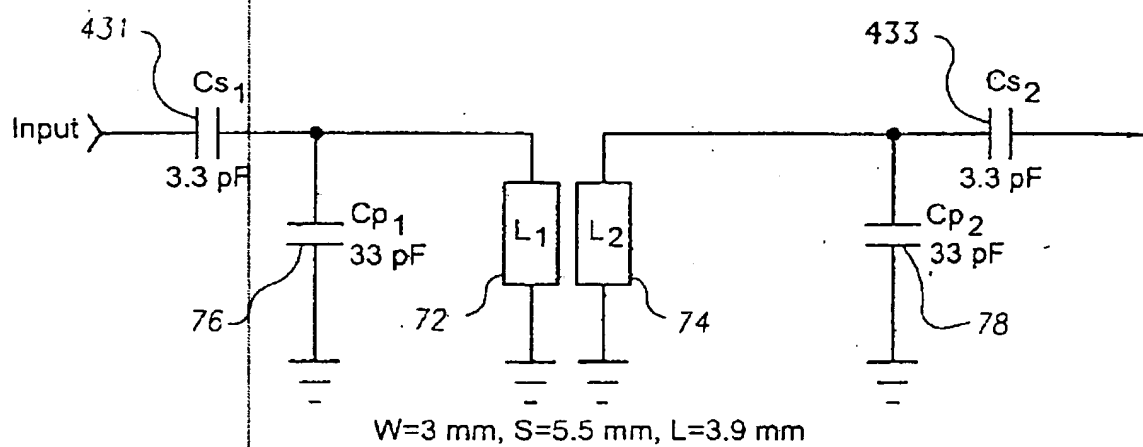
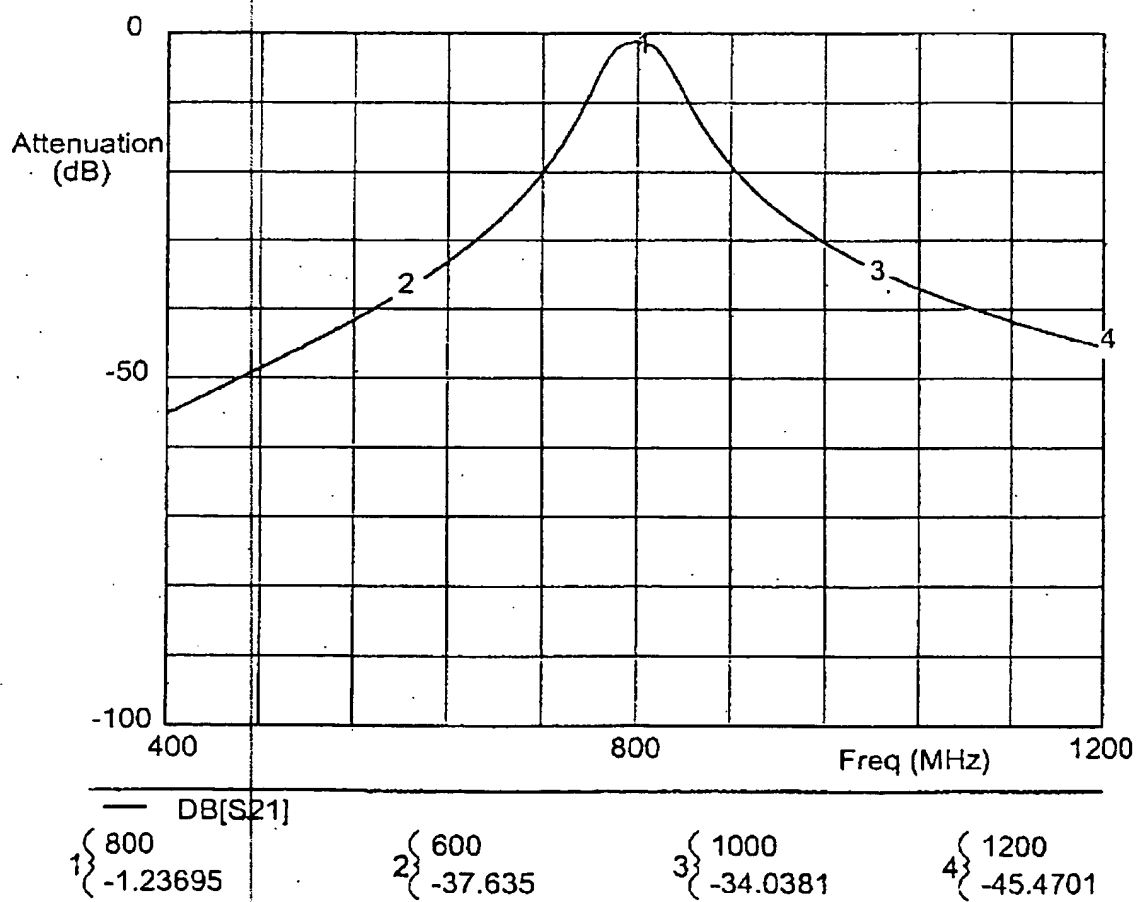


FIG. 15



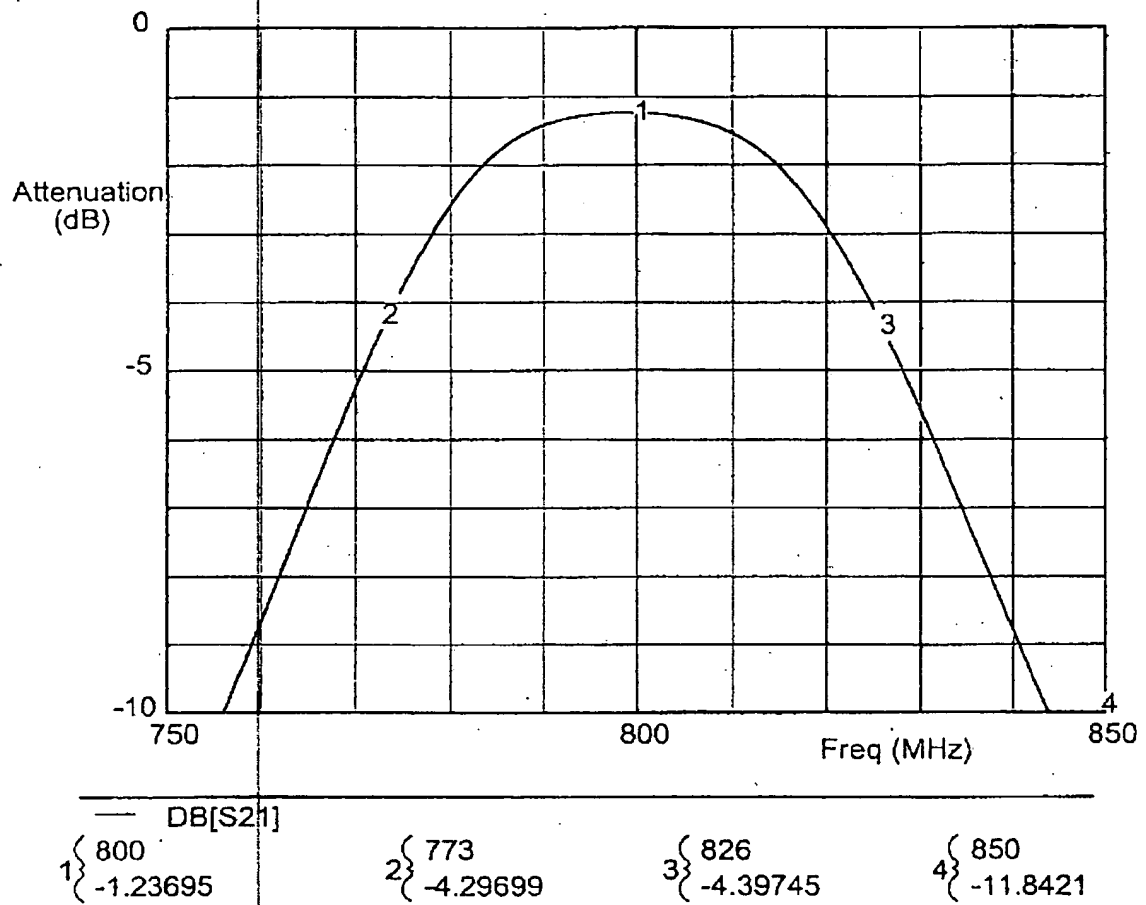
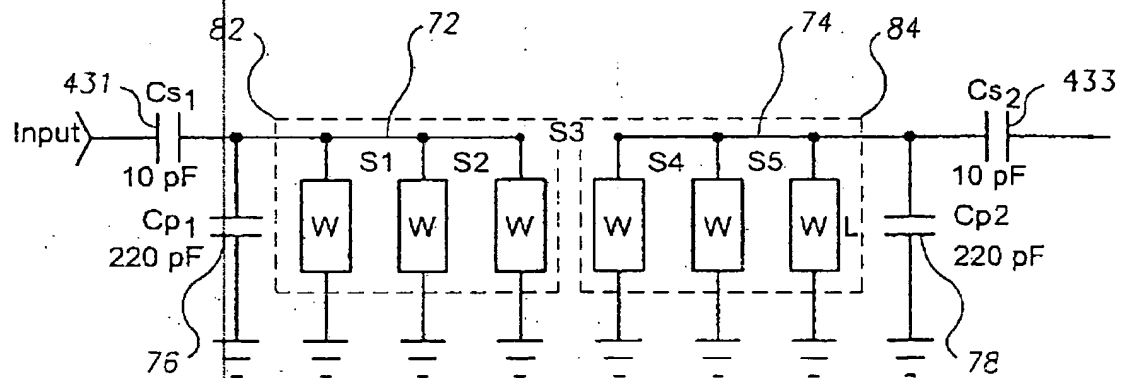


FIG. 16b



Multistrip_coupled microstrip
line(2 resonators, 3 lines each).
Width $W=2$ mm, Length $L=5.5$ mm
Gaps: $S1=S2=S4=S5=3.85$ mm
 $S3 = 4$ mm
Dielectric: $\epsilon_r=4.65$, $\tan\delta=0.001$
Board thickness (hight) $H=1.5$ mm

FIG. 17

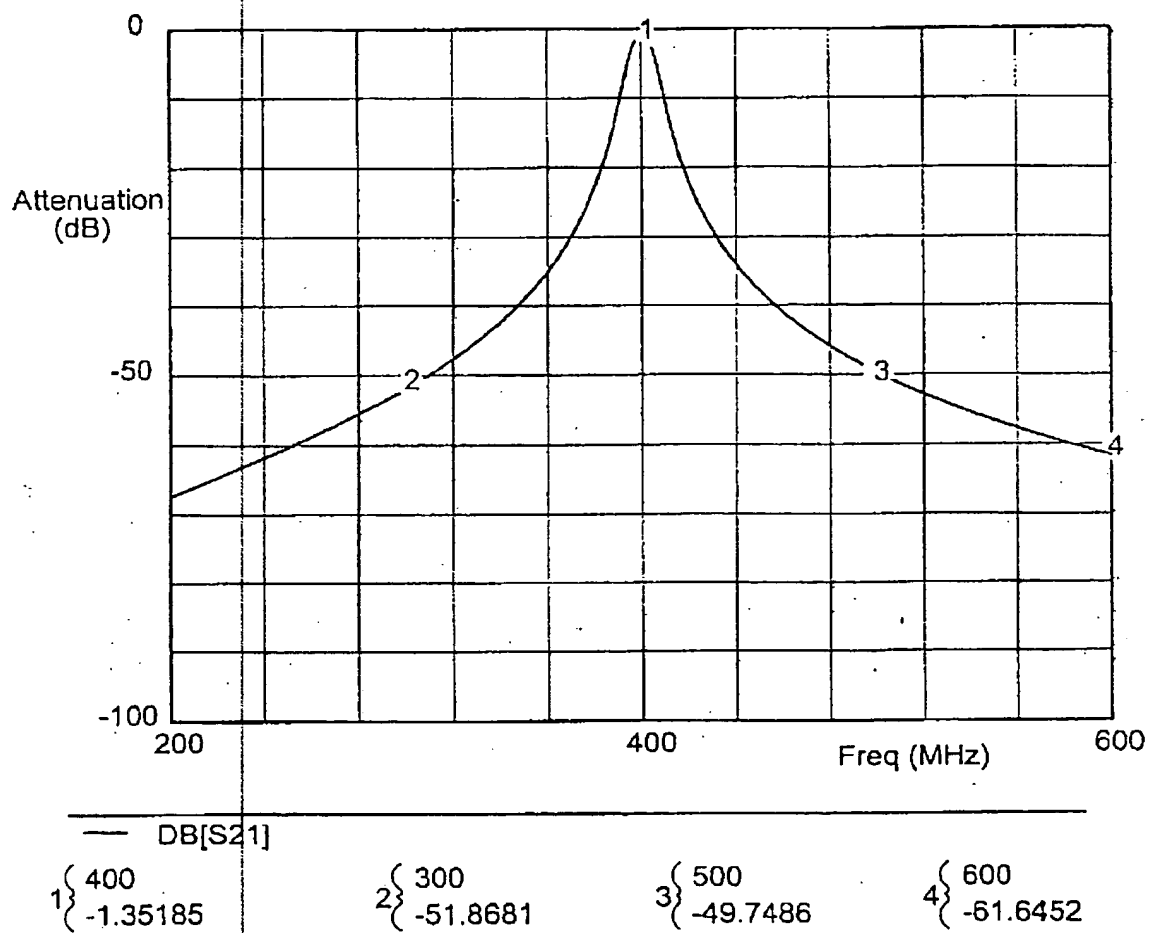
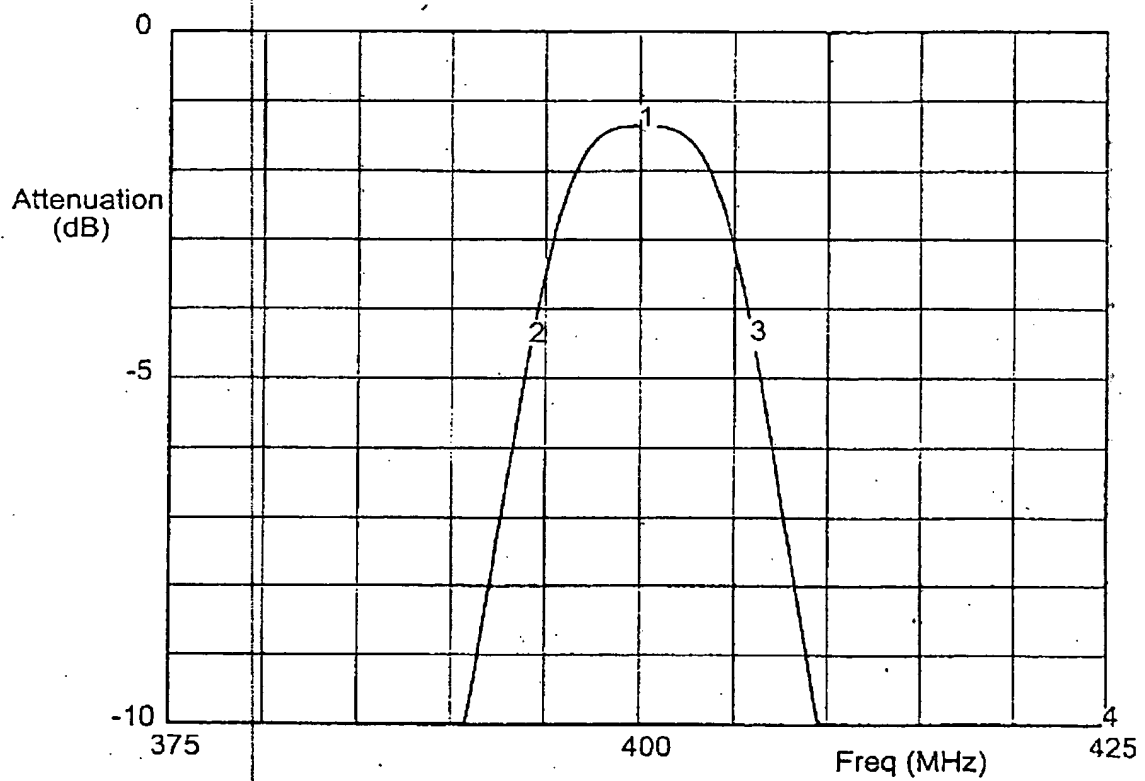


FIG. 18a



— DB[S21]

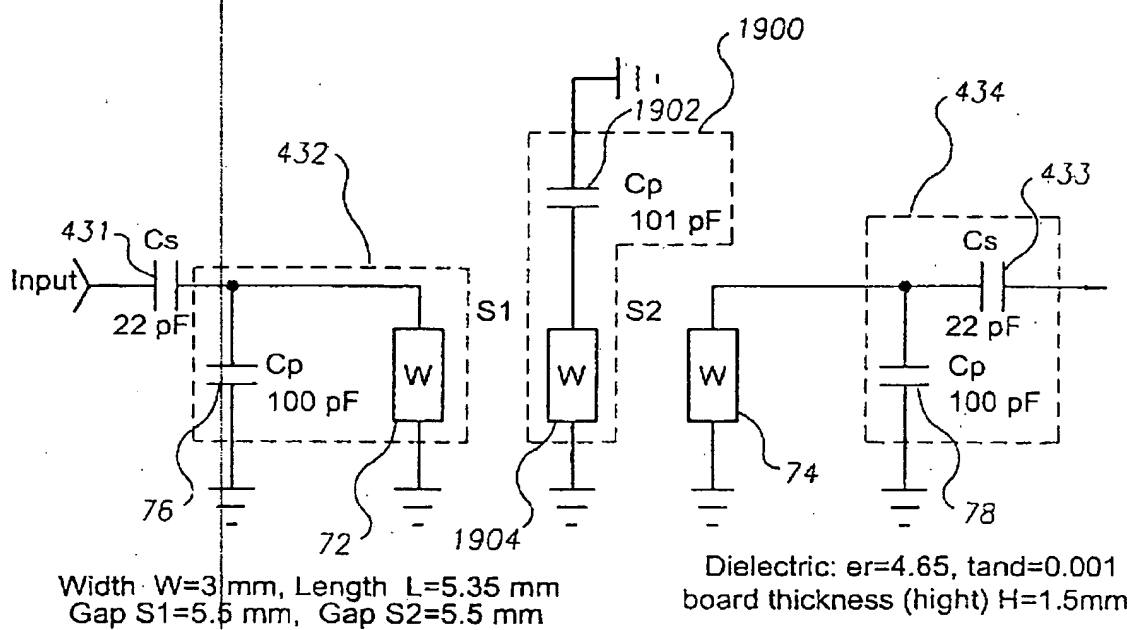
1 { 400
-1.35185

2 { 394.25
-4.47513

3 { 406
-4.43991

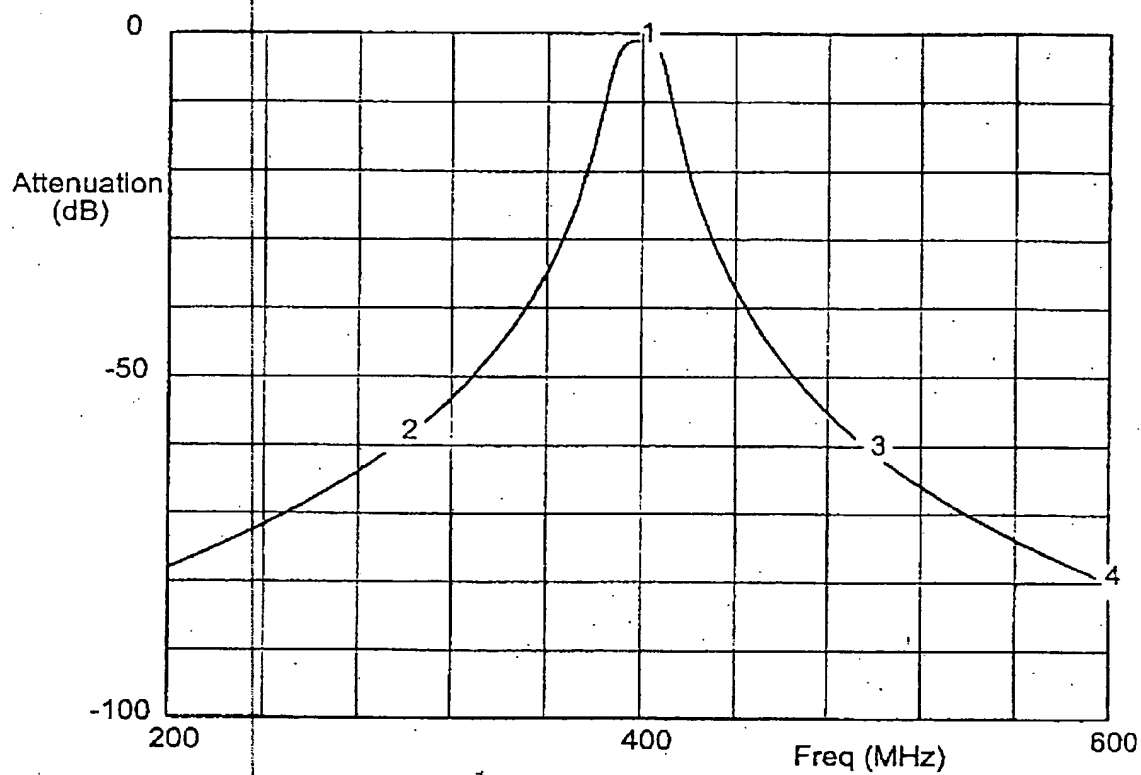
4 { 425
-26.022

FIG. 18b



Multiple_coupled microstrip line
 (3coupled resonators in cascade)

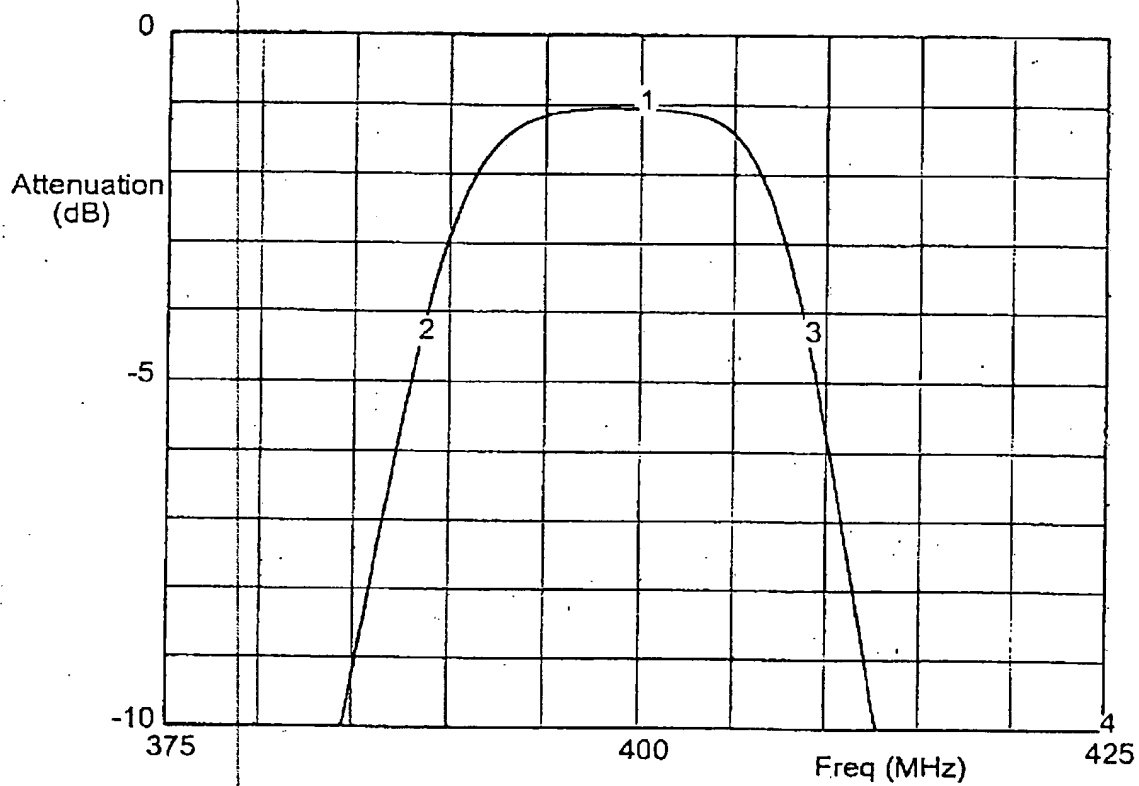
FIG. 19



— DB[S21]

1 { 400	2 { 300	3 { 500	4 { 600
-1.05798	-59.0384	-61.1136	-80.0114

FIG. 20a



— DB[S21]

1 { 400	2 { 388.5	3 { 409	4 { 425
-1.05798	-4.38529	-4.3905	-25.5458

FIG. 20b

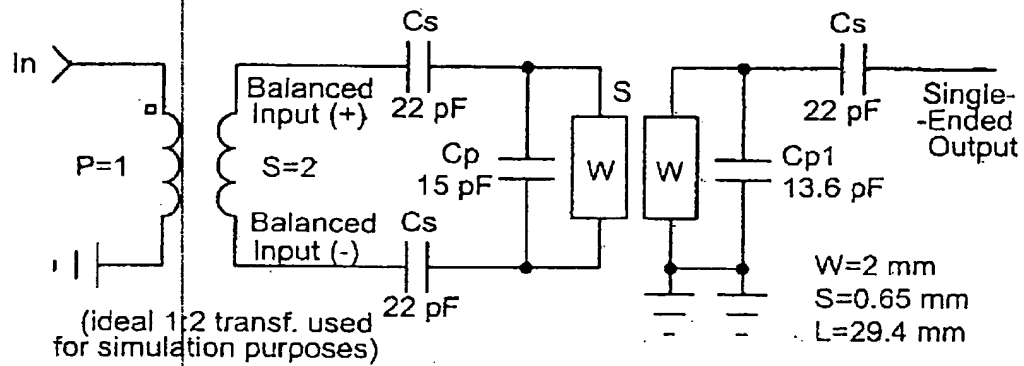


FIG. 21

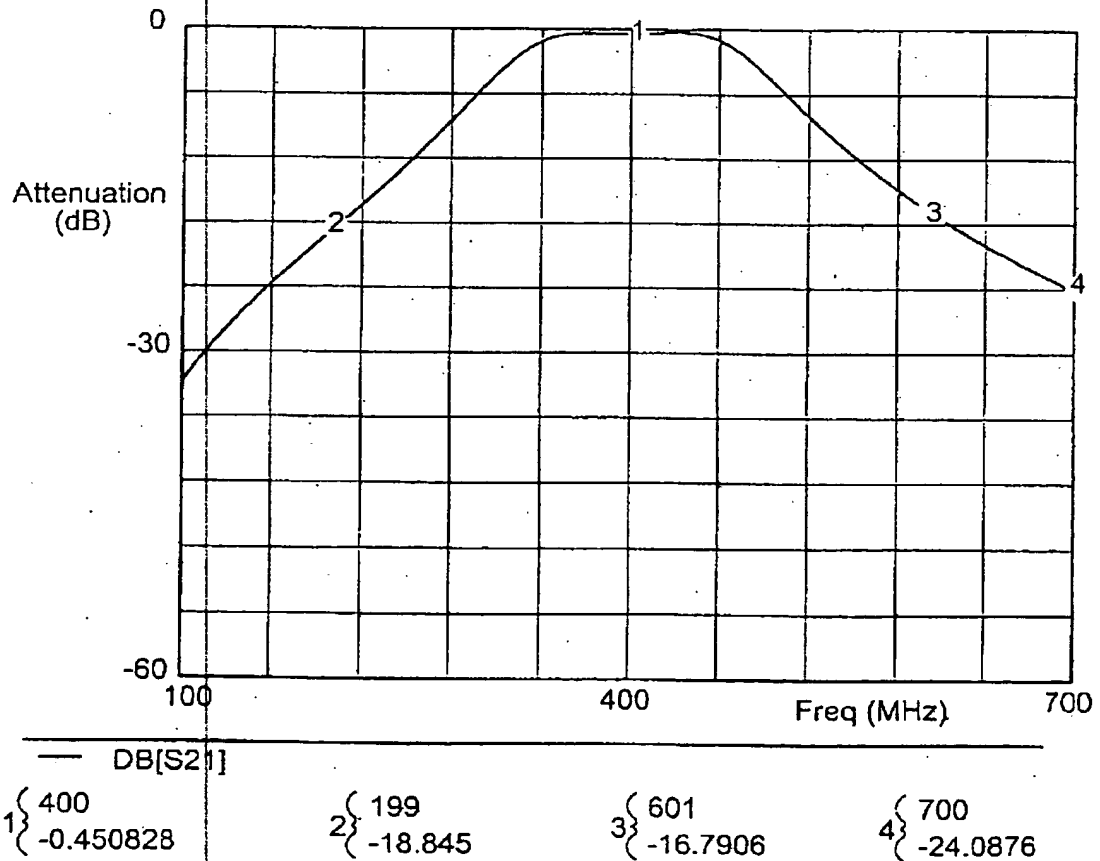


FIG. 22a

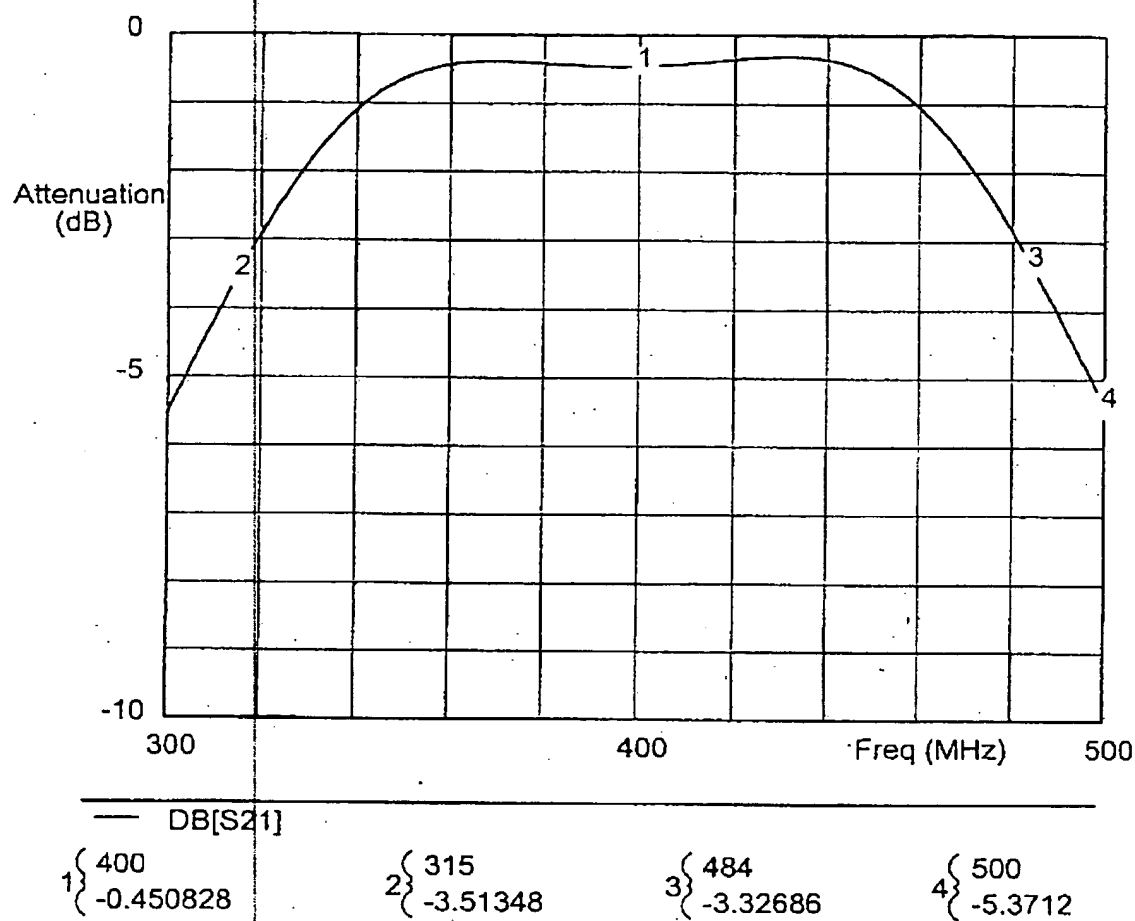


FIG. 22b

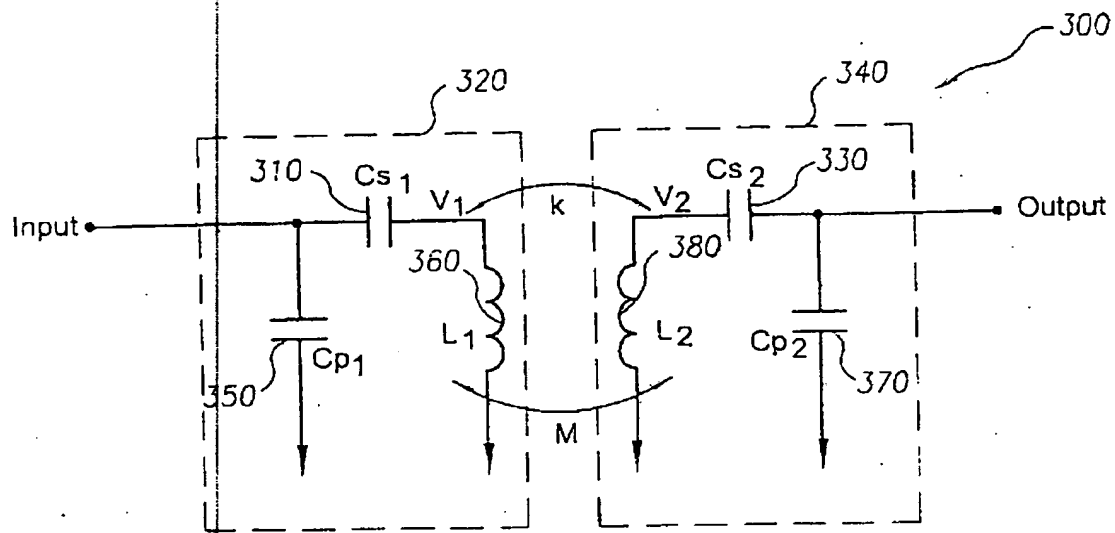


FIG. 23

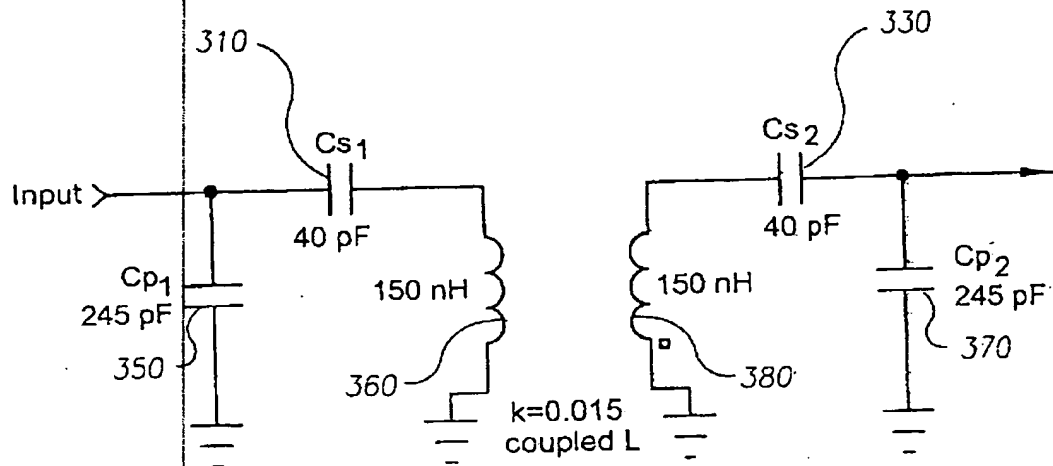
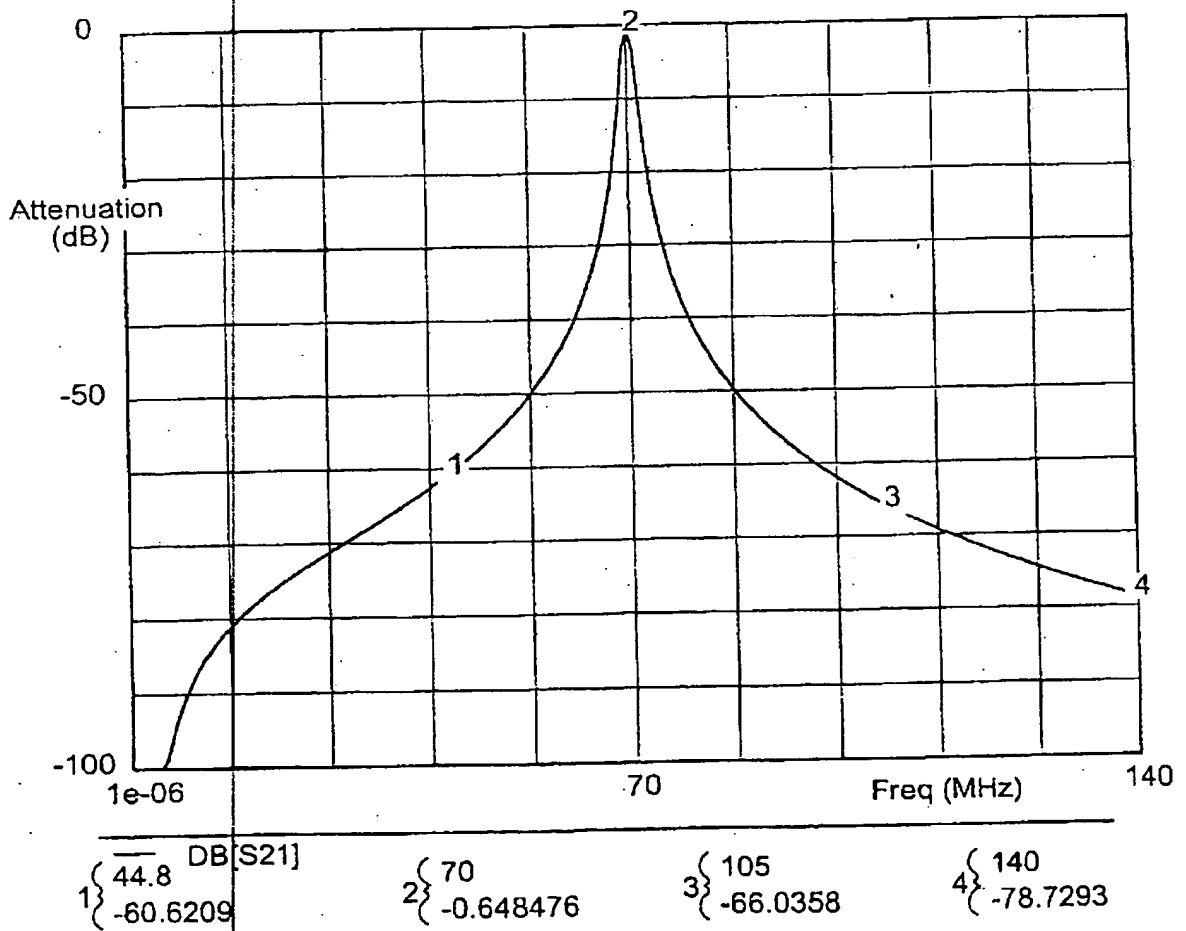


FIG. 24



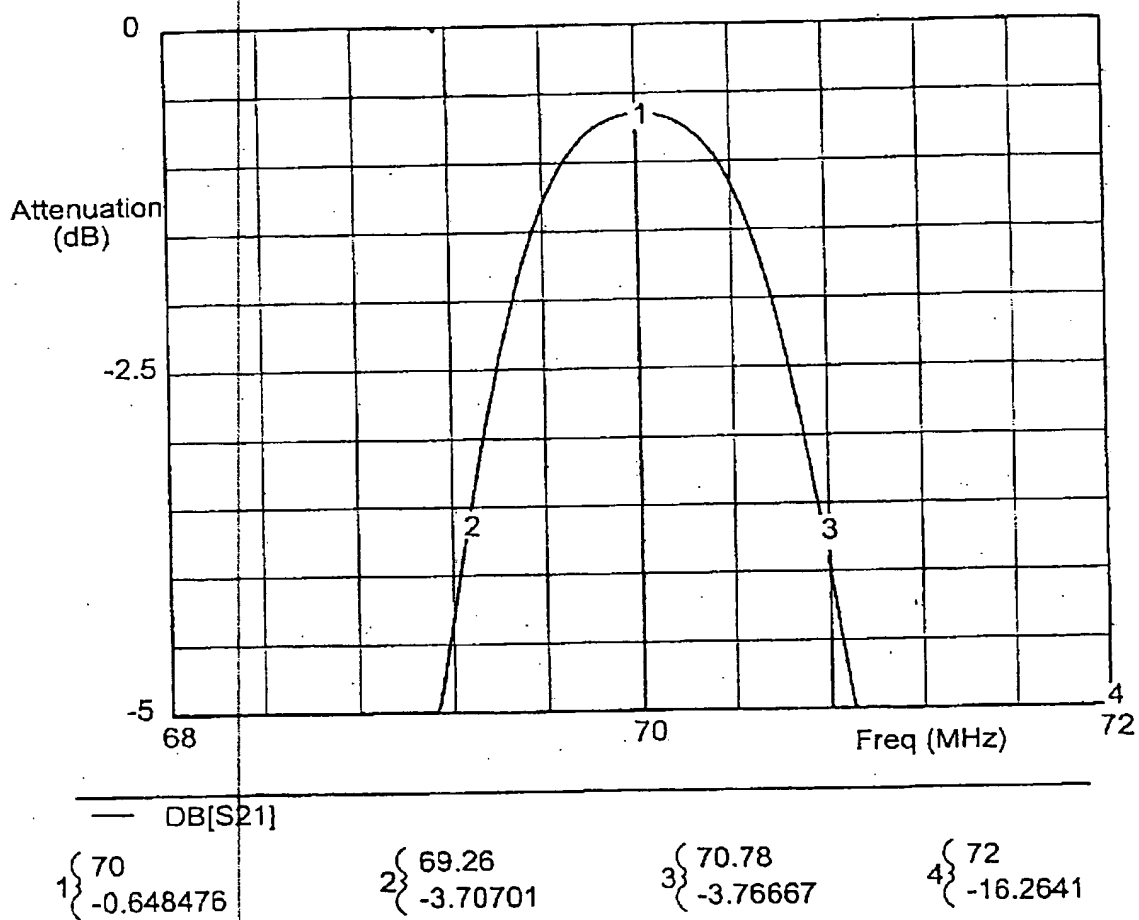


FIG. 25b

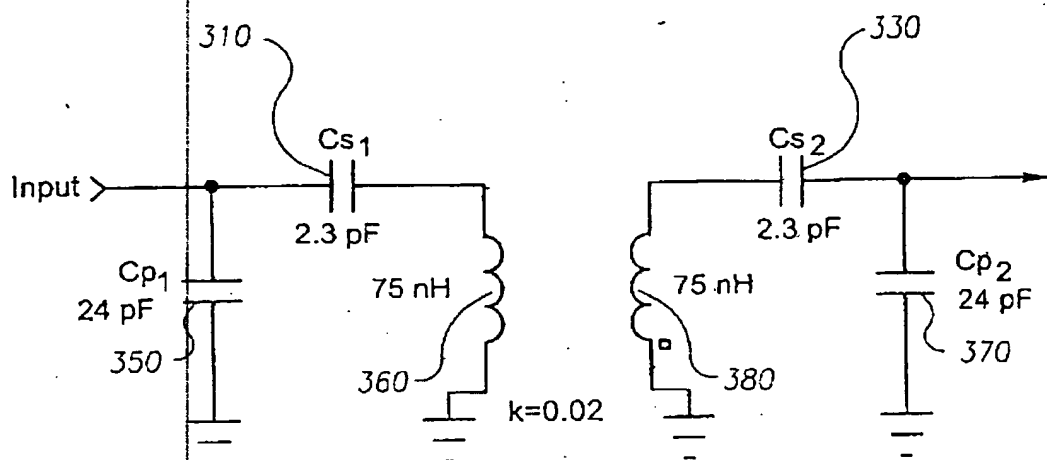
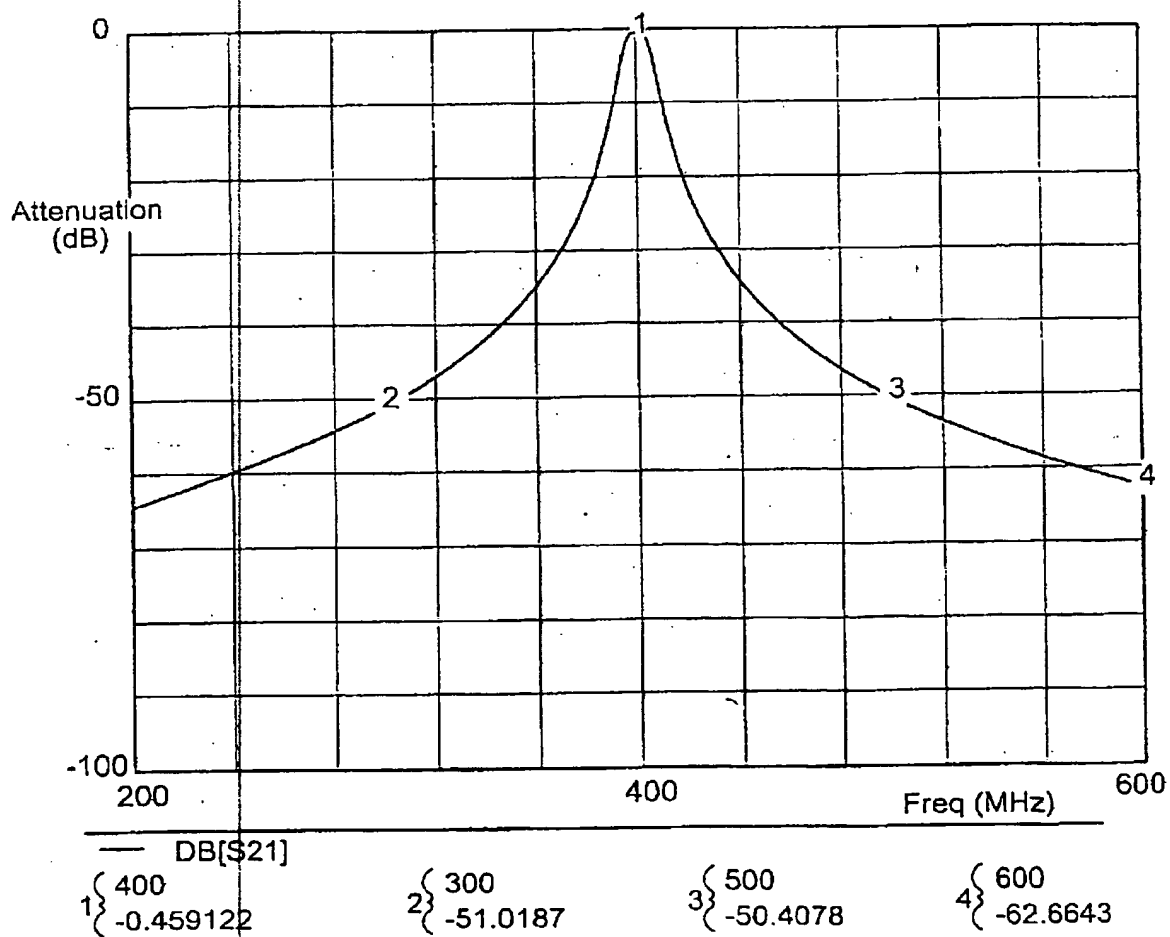


FIG. 26



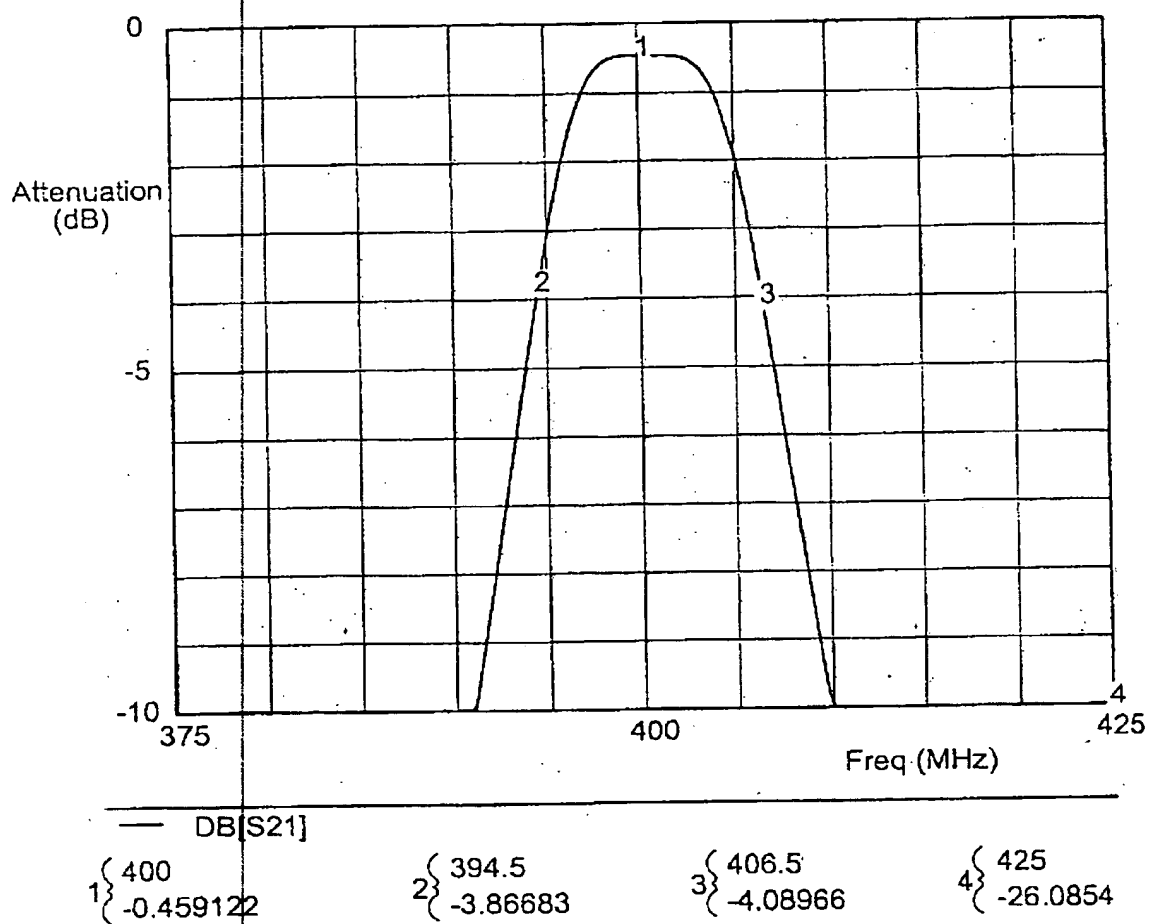


FIG. 27b

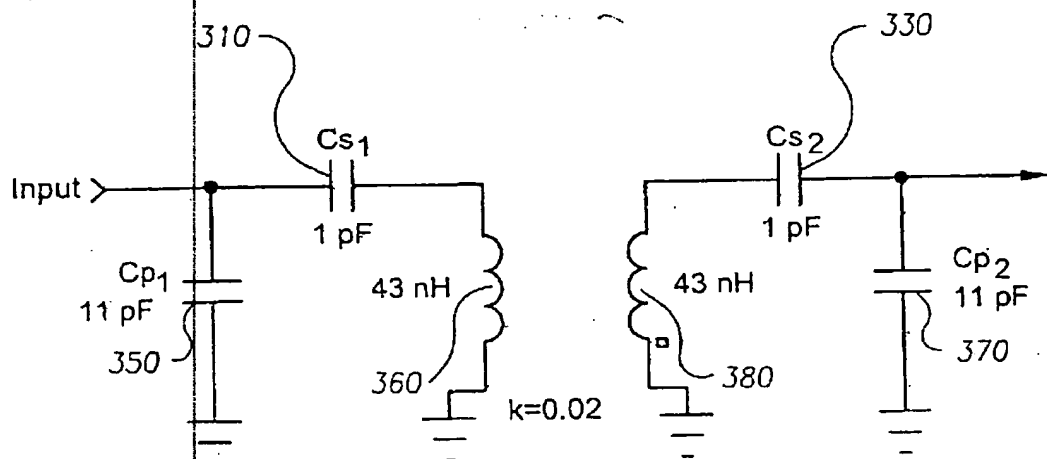
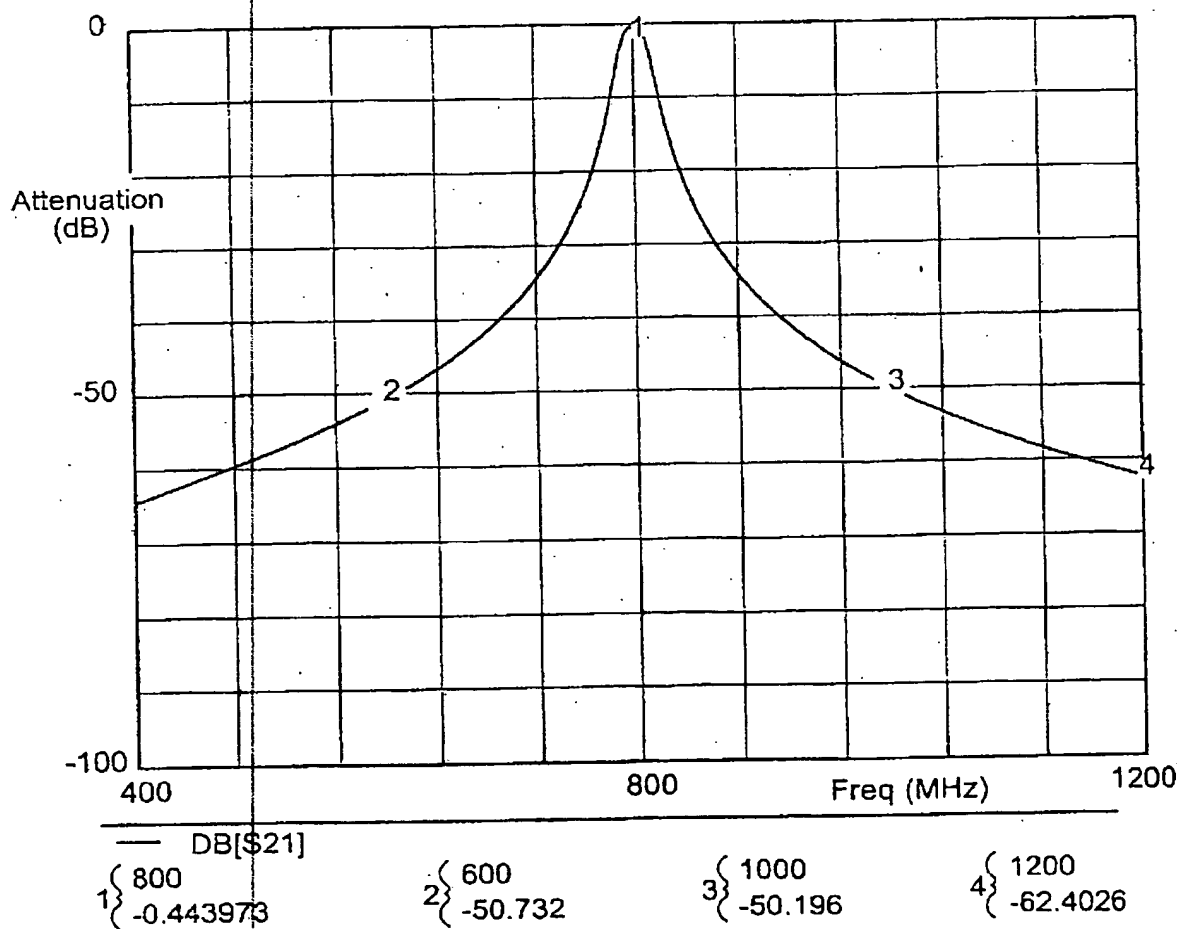
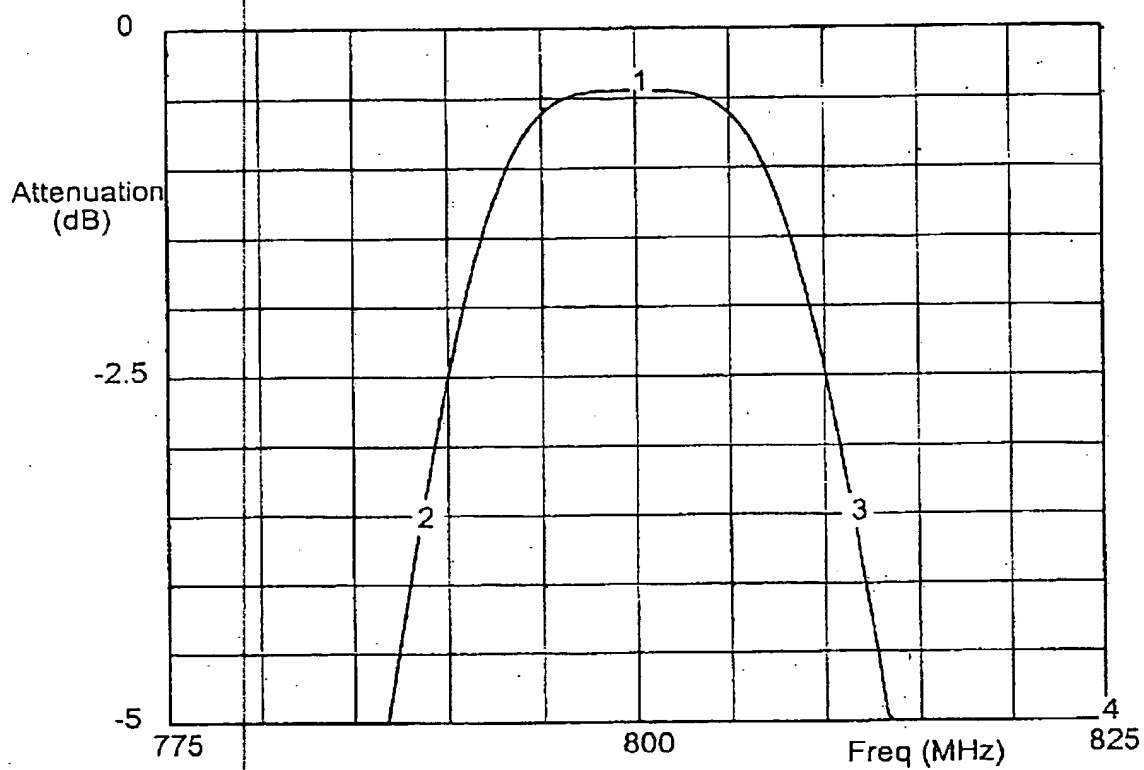


FIG. 28





— DB[S21]

Freq (MHz)	Attenuation (dB)
800	-0.443973
788.5	-3.57842
811.5	-3.54287
825	-14.2697

FIG. 29b

Equivalent Inductance of Micro-Strip transmission lines used in example filters					
Dielectric constant = 4.65; Height = 1.5mm; Copper thickness: 0.018mm					
Filter Example #	Filter Center Frequency (MHz)	Length of uStrip line (mm)	Width of uStrip line (mm)	Percentage of wave-length (%)	Equivalent Inductance of uStrip line (nH)
4	70	12.25	1.5	0.6	6.1
5	400	4	1	1.1	2.4
6	500	3.9	3	2.3	1.3
7	400	5.36	3	1.5	1.8
8 (multiple microstrip lines connected in parallel)	400	5.5	3 lines connected in parallel each 2mm wide	1.8	(2.4 nH each) 0.72nH total (see note)
9	400	29.4	2	8.5	14
10 (multiple microstrip lines connected in parallel)	400	5.5	3 lines connected in parallel each 2mm wide	1.5	(2.4 nH each) 0.72nH total (see note)
Note: Adding more microstrip lines connected in parallel (multistrip lines), very low inductance values, in order of 0.5 nH, of high accuracy and repeatability are achievable. Considering the achievable tolerances in manufacturing (length and width of the lines), a tolerance of +/-2% of the inductance value of the multistrip lines is possible.					

FIG. 30

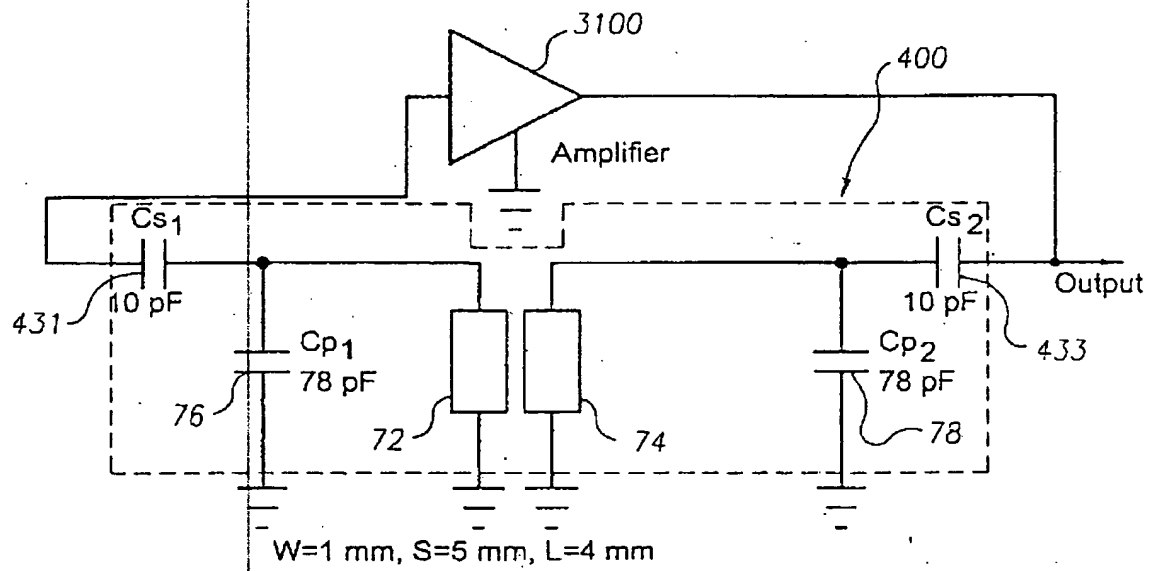


FIG. 31

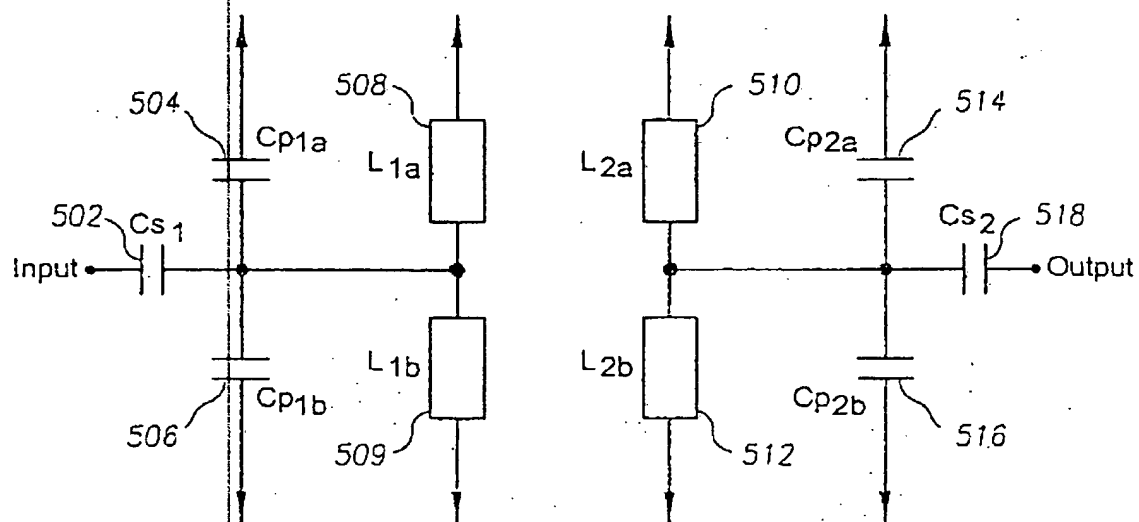


FIG. 32a

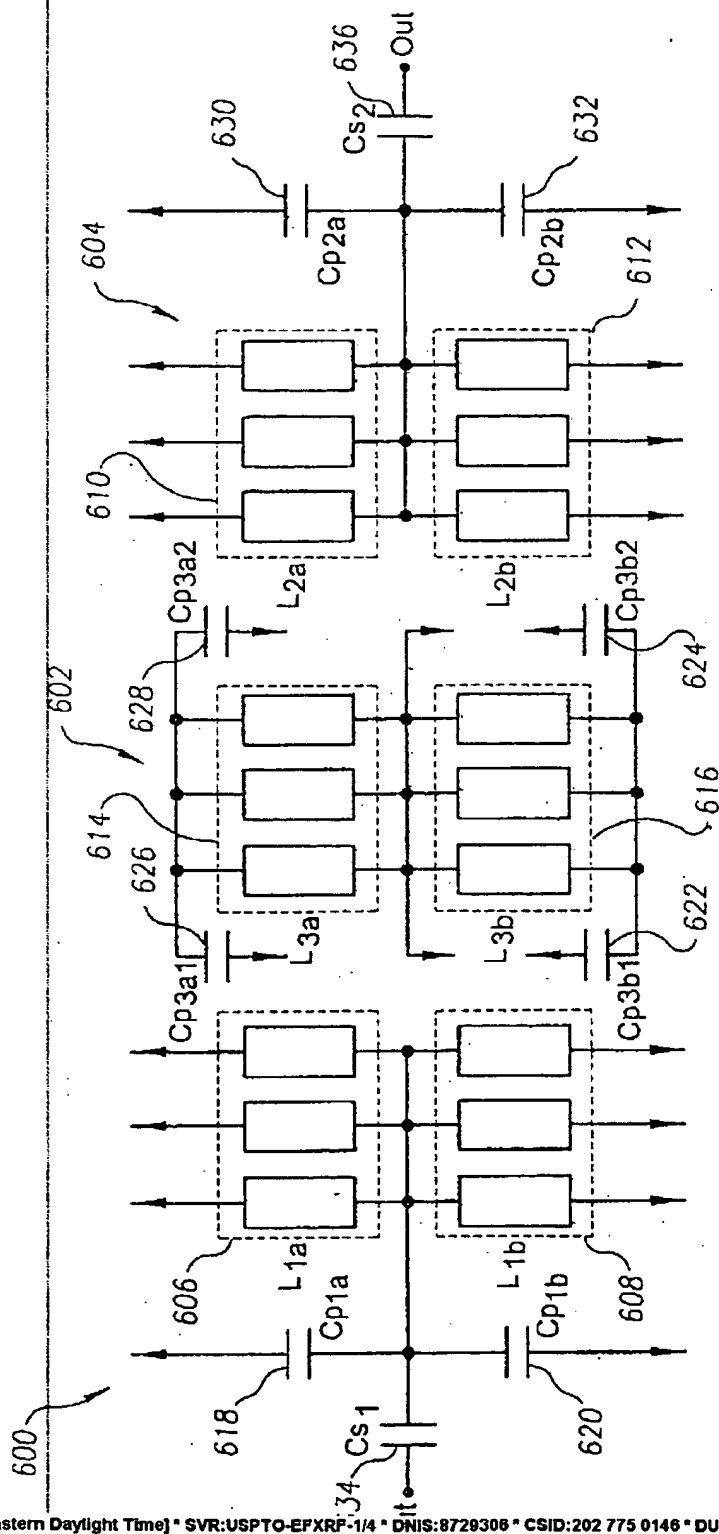
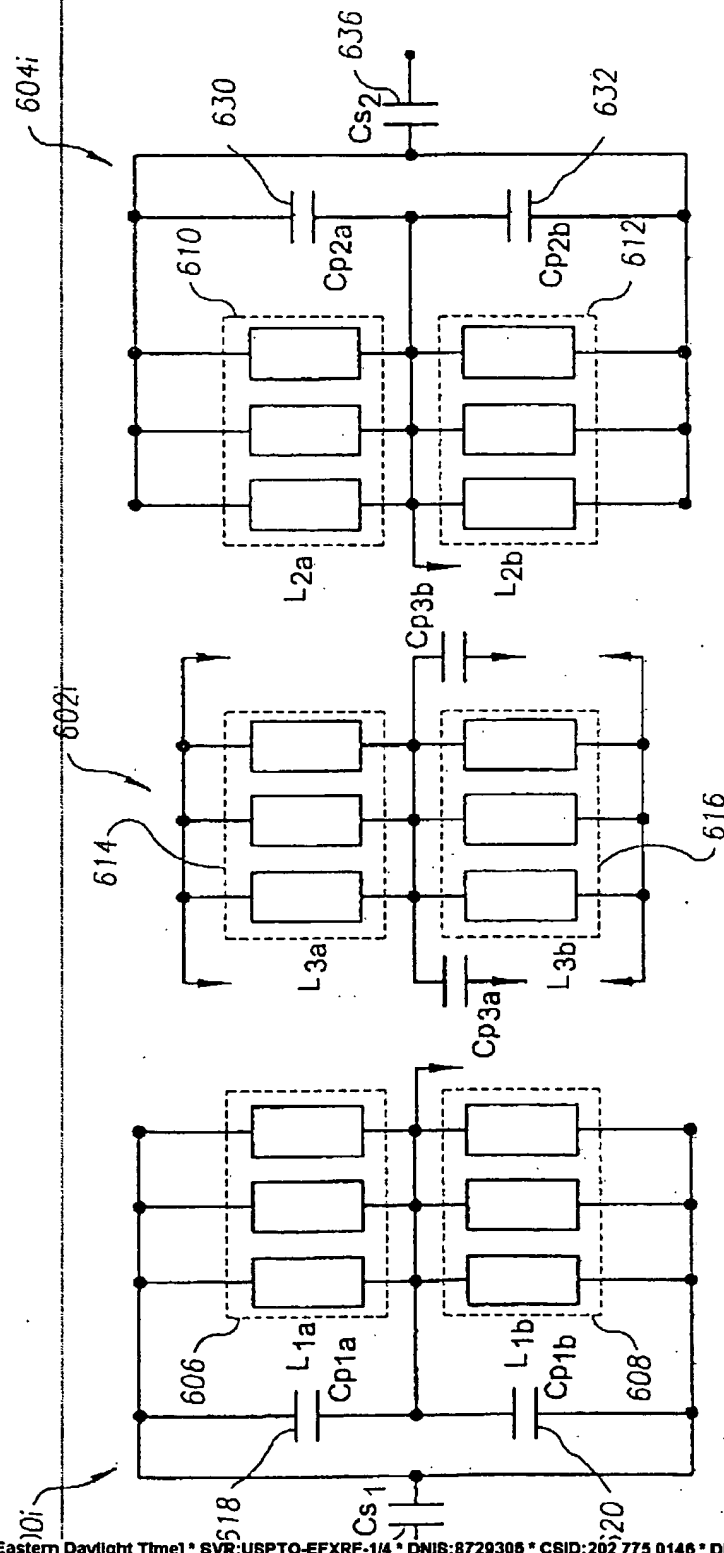


FIG. 32b



G. 32c

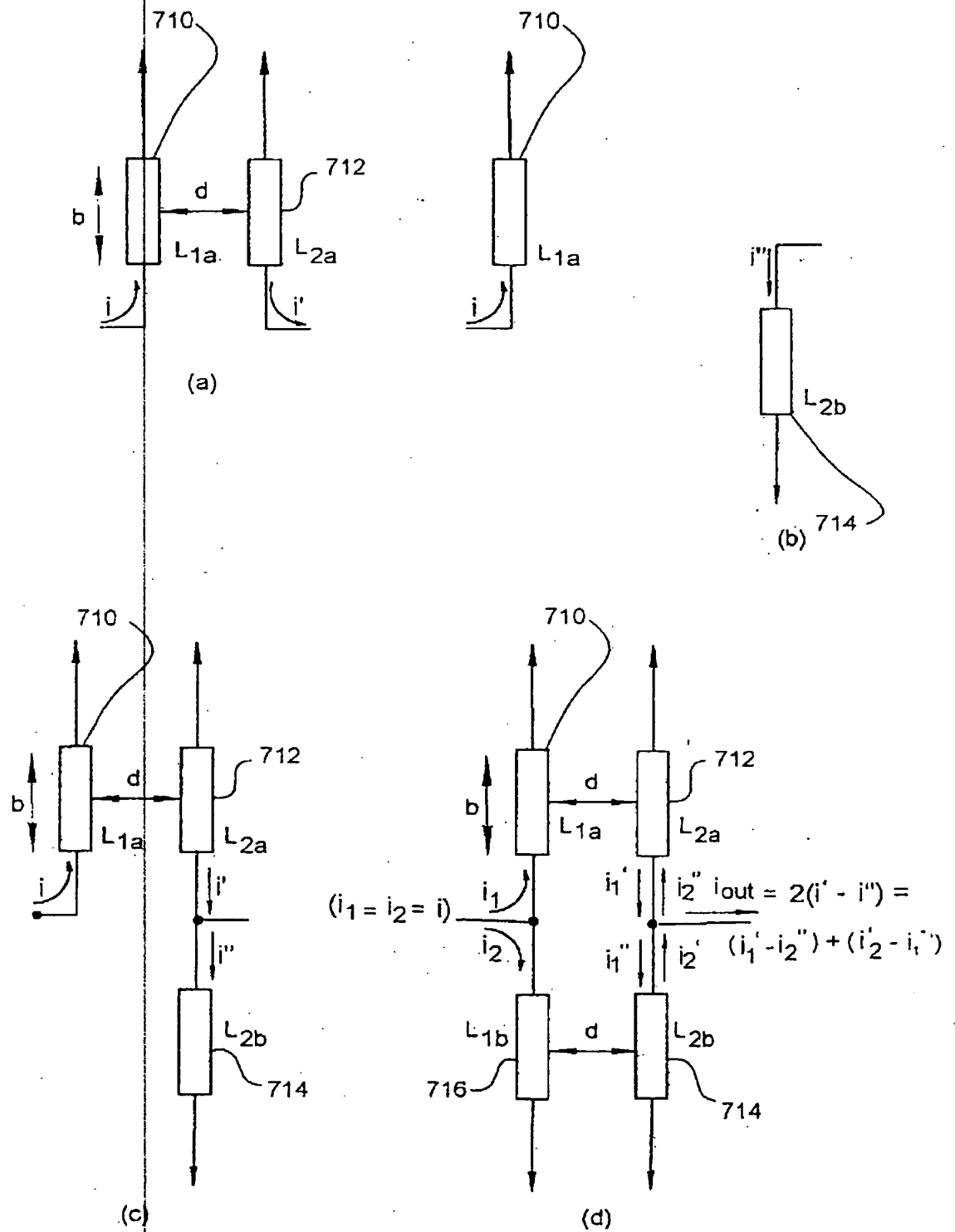
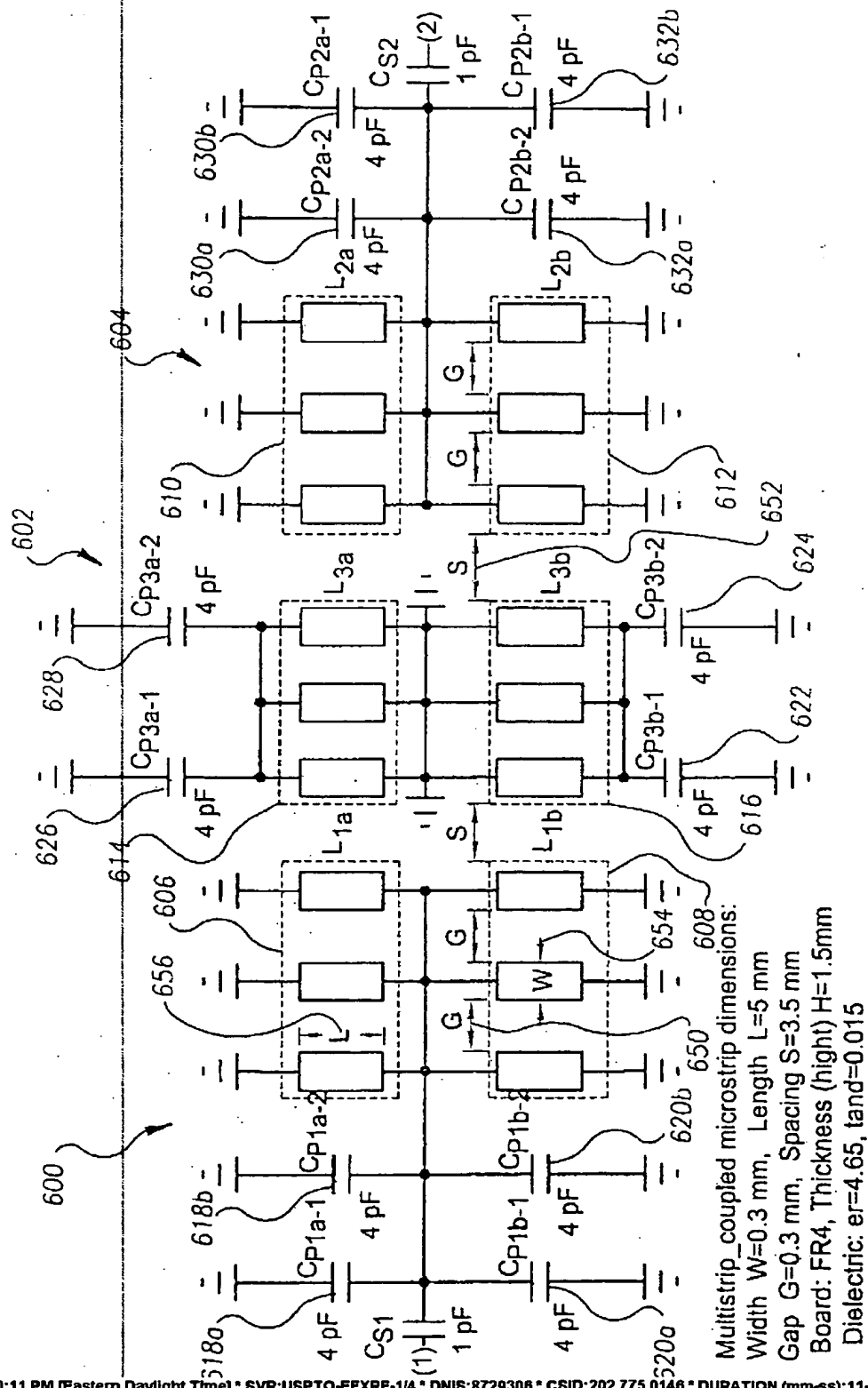


FIG. 33



1G. 34a

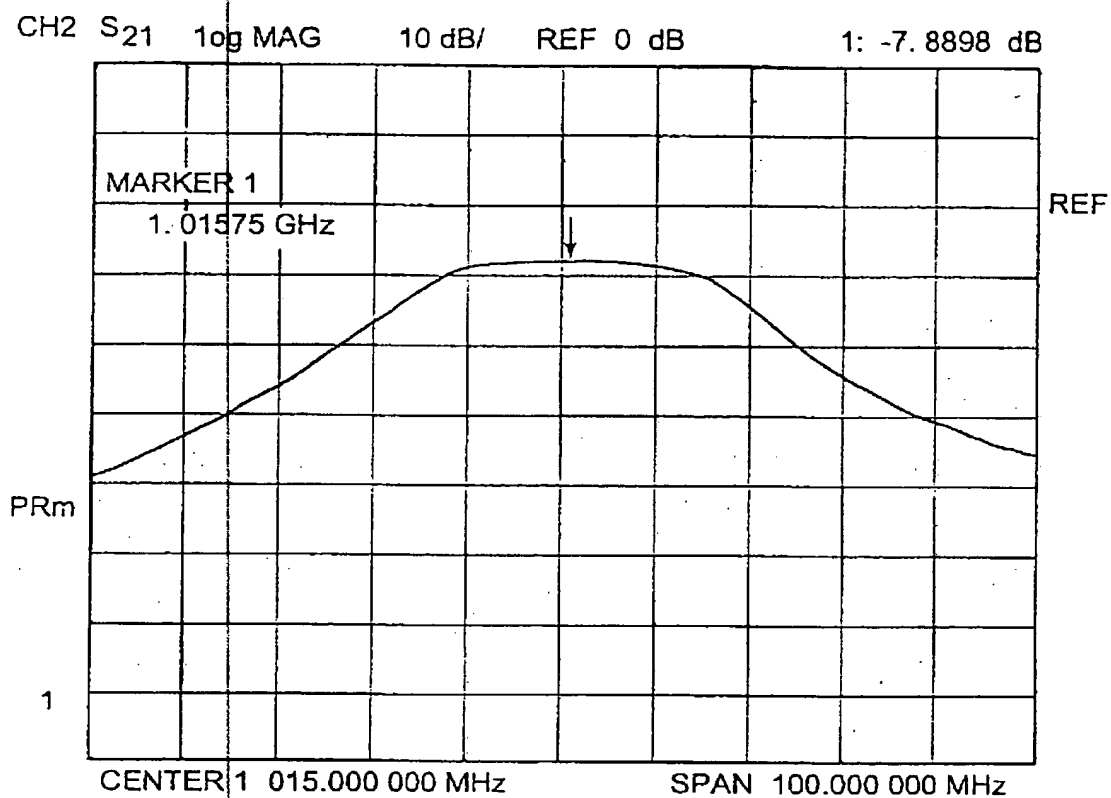


FIG. 34b

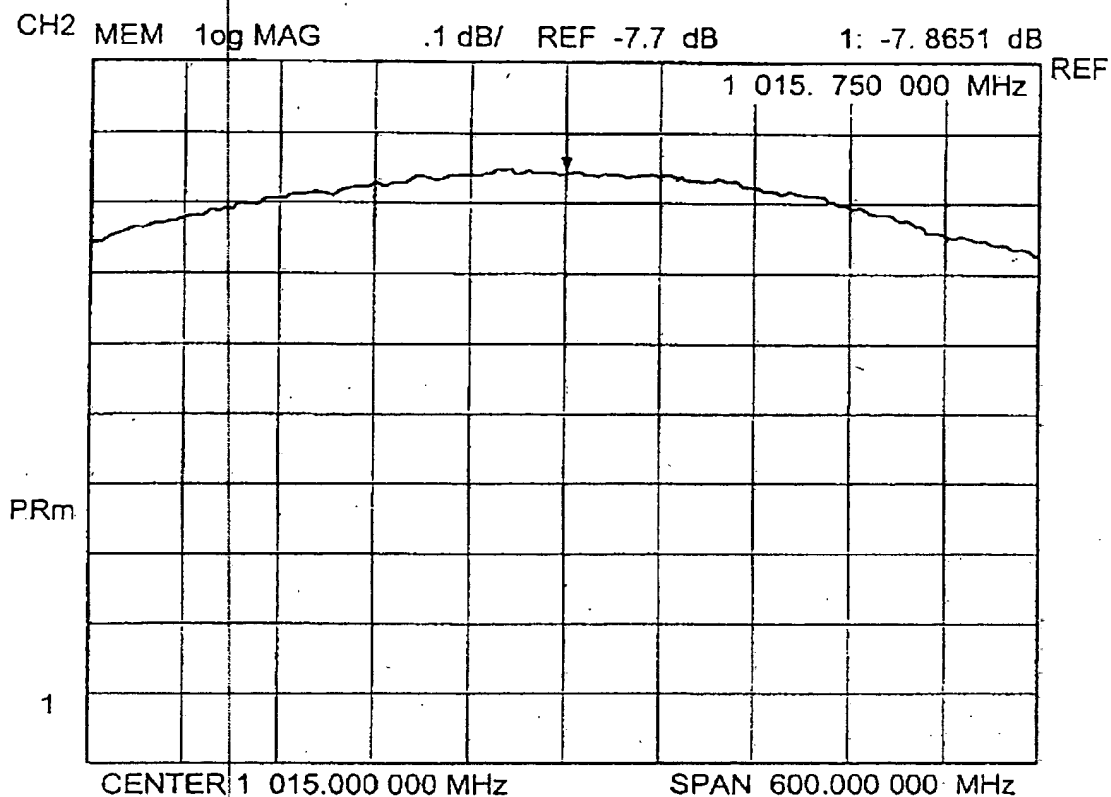


FIG. 34c

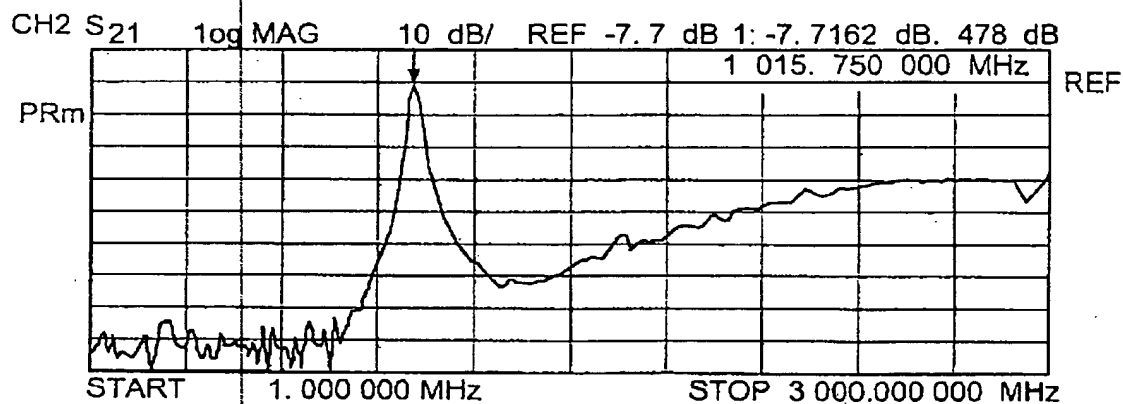


FIG. 34d

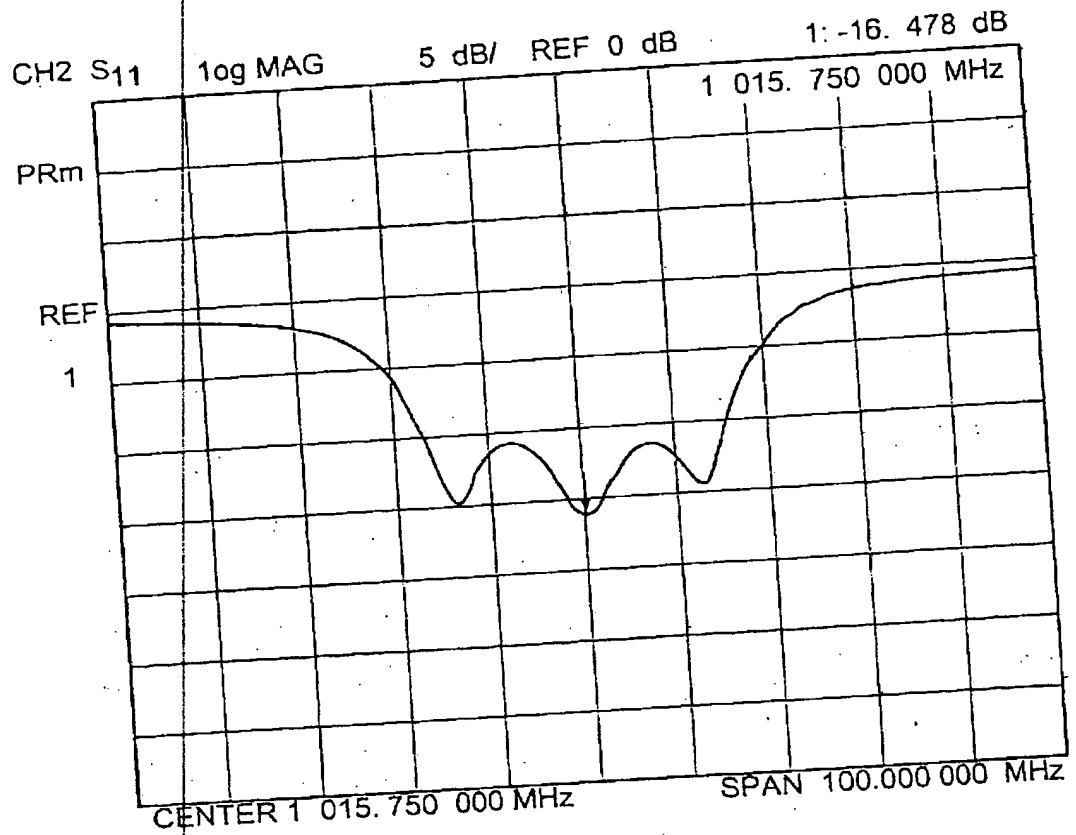


FIG. 34e

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